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CONTENTS OF VOLUME 1.

(*This volume is bound in three parts.*)

1. Report of the Auditor General for the year ending 31st March, 1918, Volume III, parts V. to Z. Presented by Sir Thomas White, March 10, 1919.
Printed for distribution and sessional papers.

Report of the Auditor General for the year ended 31st March, 1918, Volume II, Parts L to U. Presented by Sir Thomas White, March 26, 1919.
Printed for distribution and sessional papers.

Report of the Auditor General for the year ended 31st March, 1918, Volume I, Parts a, b and A. to K. Presented by Sir Thomas White, March 28, 1919.
Printed for distribution and sessional papers.

Report of the Auditor General for the year ended 31st March, 1918, Volume IV, Part ZZ. Presented by Sir Thomas White, April 22, 1919.
Printed for distribution and sessional papers.

CONTENTS OF VOLUME 2.

(This volume is bound in two parts.)

2. The Public Accounts of Canada, for the fiscal year ended 31st March, 1918. Presented by Sir Thomas White, March 3, 1919... .. ..*Printed for distribution and sessional papers.*

3. Estimates of sums required for the service of the Dominion for the year ending on the 31st March, 1920, and, in accordance with the provisions of "The British North America Act, 1867." Presented by Sir Thomas White, March 18, 1919.
Printed for distribution and sessional papers.

4. Supplementary Estimates of sums required for the service of the Dominion for the year ending on the 31st March, 1919, and, in accordance with the provisions of "The British North America Act, 1867." Presented by Sir Thomas White, May 7, 1919.
Printed for distribution and sessional papers.

4*a*. Supplementary Estimates of sums required for the service of the Dominion for the year ending on the 31st March, 1920. Presented by Sir Thomas White, March 31, 1919.
Printed for distribution and sessional papers.

5*a*. Further Supplementary Estimates of sums required for the service of the Dominion for the year ending on the 31st March, 1920. Presented by Sir Thomas White, July 3, 1919.
Printed for distribution and sessional papers.

5*b*. Further Supplementary Estimates of sums required for the service of the Dominion for the year ending on the 31st March, 1920. Pesented by Sir Thomas White, July 5, 1919.
Printed for distribution and sessional papers.

5*c*. Further Supplementary Estimates of sums required for the service of the Dominion for the year ending on the 31st March, 1912.
Printed for distribution and sessional papers

8. Report of the Superintendent of Insurance for the year 1918—Vols. I and II.
Printed for distribution and sessional papers.

9. Abstract of Statements of Insurance Companies in Canada for the year ended 31st December, 1918. (Subject to corrections.) Presented by Hon. Mr. Maclean, June 23, 1919.
Printed for distribution and sessional papers.

CONTENTS OF VOLUME 3.

10. Annual Report of the Department of Trade and Commerce, for the fiscal year ending 31st March, 1919. Presented by Hon. Mr. Burrell, July 4, 1919.
Printed for distribution and sessional papers.

10a. Report relating to Mail Subsidies and Steamship Subventions as controlled by the Department of Trade and Commerce, for the fiscal year ending 31st March, 1918, with traffic returns, etc., to 31st December, 1918. Presented by Hon. Mr. Maclean, May 8, 1919.
Printed for distribution and sessional papers.

10b. Annual Report of the Trade of Canada (imports for consumption and exports), for the fiscal year ending 31st March, 1918. Presented by Hon. Mr. Maclean, May 28, 1919.
Printed for distribution and sessional papers.

10c. Grain Commissioners of Canada, year ending March 31, 1918.
Printed for distribution and sessional papers.

10d. Criminal Statistics for year ended September, 1918.
Printed for distribution and sessional papers.

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11. Trade Report of the Department of Customs containing the tables and statements of Imports and Exports of the Dominion of Canada for the fiscal year ending 31st March, 1918. Presented by Hon. Mr. Reid, March 18, 1919.
Printed for distribution and sessional papers.

11a. Shipping Report of the Department of Customs, containing the statements of Navigation and Shipping of the Dominion of Canada, for the fiscal year ending 31st March, 1918. Presented by Hon. Mr. Reid, March 25, 1919.
Printed for distribution and sessional papers.

CONTENTS OF VOLUME 5.

12. Reports, Returns and Statistics of the Inland Revenue of the Dominion of Canada, for the year ending 31st March, 1918.—Part I.—Excise. Presented by Hon. Mr. Reid, March 18, 1919... .. .. *Printed for distribution and sessional papers.*

13. Inland Revenue, Annual Report, Part II—Weights and Measures, Gas and Electricity.
Printed for distribution and sessional papers.

14. Inland Revenue, Annual Report, Part III—Adulteration of Food.
Printed for distribution and sessional papers.

15. Report of the Minister of Agriculture for the Dominion of Canada, for the year ending 31st March, 1918. Presented by Hon. Mr. Crerar, February 28, 1919.
Printed for distribution and sessional papers.

15a. The Agricultural Instruction Act, 1917-18, pursuant to section 8, chapter 5 of 3-4 George V. Presented by Hon. Mr. Crerar, February 28, 1919.
Printed for distribution and sessional papers.

15b Report of the Veterinary Director General for the year ending March 31, 1918. Presented by Hon. Mr. Carvell, July 5, 1919... .. ..*Printed for distribution and sessional papers.*

16. Report of the Dominion Experimental Farms for the fiscal year ending 31st March, 1918. —Appendix to the Report of the Minister of Agriculture. Presented by Hon. Mr. Crerar, February 28, 1919.. .. ..*Printed for distribution and sessional papers.*

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17. Report of the Census of Industry, 1917. Part I, Agricultural Statistics. Presented by Hon. Mr. Carvell, March 18, 1919.. .. ..*Printed for distribution and sessional papers.*

17a. Report of the Census of Industry, 1917—Part II. Dairying.
Printed for distribution and sessional papers.

17b. Report of the Census of Industry, 1917—Part III. Fisheries Statistics.
Printed for distribution and sessional papers.

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17c. Report of the Census of Industry, 1917—Part IV, Section 4, Pulp and Paper. Presented by Hon. Mr. Maclean, April 24, 1919.. ..*Printed for distribution and sessional papers.*

17c. (1) Report of the Census of Industry, 1917, Part IV—Forestry—Lumber, Laths and Shingles. *Printed for distribution and sessional papers.*

17c. (3) Report of the Census of Industry, 1917—Part IV—Forestry—Sash and Doors, Planing Mills, etc. *Printed for distribution and sessional papers.*

17c. (4) Report of the Census of Industry, 1917, Part IV—Forestry—Pulp and Paper. *Printed for distribution and sessional papers.*

17c. (5) Report of the Census of Industry, 1917, Part IV—Forestry—Wood Distillation. *Printed for distribution and sessional papers.*

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18. Annual Report of the Department of Immigration and Colonization, for the fiscal year ending 31st March, 1918. Presented by Hon. Mr. Calder, February 28, 1919. *Printed for distribution and sessional papers.*

19. Report of the Minister of Public Works on the works under his control, for the fiscal year ending 31st March, 1918. Presented by Hon. Mr. Carvell, February 26, 1919. *Printed for distribution and sessional papers.*

20. Annual Report of the Department of Railways and Canals, for the fiscal year from 1st April, 1917, to 31st March, 1918. Presented by Hon. Mr. Reid, March 26, 1919. *Printed for distribution and sessional papers.*

20a. Canal Statistics for the season of navigation, 1918. Presented by Hon. Mr. Reid, May 30, 1919... .. ..*Printed for distribution and sessional papers.*

20b. Railway Statistics of the Dominion of Canada, for the year ending 30th June, 1918. Presented by Hon. Mr. Reid, May 30, 1919. ..*Printed for distribution and sessional papers.*

20c. Thirteenth Report of the Board of Railway Commissioners for Canada, for the year ending 31st March, 1918. Presented by Hon. Mr. Reid, February 27, 1919. *Printed for distribution and sessional papers.*

20d. Telephone Statistics of the Dominion of Canada, for the year ending 30th June, 1918. Presented by Hon. Mr. Reid, April 24, 1919. *Not printed.*

20e. Express Statistics of the Dominion of Canada, for the years ended June 30, 1917 and 1918. Presented by Hon. Mr. Reid, April 24, 1919.. *Not printed.*

20f. Telegraph Statistics of the Dominion of Canada, for the years ending June 30, 1917 and 1918. Presented by Hon. Mr. Reid, April 24, 1919. *Not printed.*

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21. Fifty-first Annual Report of the Department of Marine and Fisheries, for the year 1917-18—Marine. Presented by Hon. Mr. Maclean, Febuary 26, 1919. *Printed for distribution and sessional papers.*

22. List of Shipping issued by the Department of Marine and Fisheries, as on the 31st December, 1918. Presented by Hon. Mr. Ballantyne, June 16, 1919. *Printed for distribution and sessional papers.*

23. Supplement to the Fifty-first Annual Report of the Department of Marine and Fisheries, for the fiscal year 1917-18 (Marine)—Steamboat Inspection Report. Presented by Hon. Mr. Ballantyne, May 13, 1919... .. .. ..*Printed for distribution and sessional papers.*

24. Report of the Postmaster General, for the year ending 31st March, 1918. Presented by Hon. Mr. Rowell, February 26, 1919.. ..*Printed for distribution and sessional papers.*

25. Annual Report of the Department of the Interior, for the fiscal year ending 31st March, 1918. Presented by Hon. Mr. Meighen, March 4, 1919. *Printed for distribution and sessional papers.*

26. Summary Report of the Geological Survey, Department of Mines, for the calendar year 1918. Presented by Hon. Mr. Maclean, March 28, 1919. *Printed for distribution and sessional papers.*

26a. Summary Report of the Mines Branch of the Department of Mines, for the calendar year, 1918.. .. .. *Printed for distribution and sessional papers.*

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27. Report of the Department of Indian Affairs, for the year ending 31st March, 1918. Presented by Hon. Mr. Meighen, March 6, 1919.
Printed for distribution and sessional papers.

28. Report of the Royal Northwest Mounted Police, for the year ending 30th September, 1918. Presented by Hon. Mr. Rowell, June 16, 1919.
Printed for distribution and sessional papers.

29. Report of the Secretary of State of Canada, for the year ending 31st March, 1918. Presented by Hon. Mr. Burrell, March 3, 1919.
Printed for distribution and sessional papers.

29a. Canadian Archives, for year ended December 31, 1918.
Printed for distribution and sessional papers.

30. The Civil Service List of Canada, 1918. Presented by Hon. Mr. Burrell, March 12, 1919.
Printed for distribution and sessional papers.

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31. Tenth Annual Report of the Civil Service Commission of Canada, for the year ending 31st August, 1918. Presented by Hon. Mr. Burrell, April 7, 1919.
Printed for distribution and sessional papers.

32. Annual Report of the Department of Public Printing and Stationery, for the fiscal year ending 31st March, 1918. Presented by Hon. Mr. Maclean, April 10, 1919.
Printed for distribution and sessional papers.

33. Report of the Secretary of State for External Affairs, for the year ending 31st March, 1918. Presented by Hon. Mr. Rowell, April 9, 1919.
Printed for distribution and sessional papers.

34. Report of the Minister of Justice as to Penitentiaries, for fiscal year ending March 31. 1918.
Printed for distribution and sessional papers.

35. Report of the Militia Council for the Dominion of Canada, for the fiscal year ending 31st March, 1918. Presented by Hon. Mr. Mewburn, February 26, 1919.
Printed for distribution and sessional papers.

36. Report of the Department of Labour, for the fiscal year ending 31st March, 1918. Presented by Sir Thomas White, May 26, 1919.
Printed for distribution and sessional papers.

37. Annual Report of the Editorial Committee on Governmental Publications, dated 1st March, 1919. Presented by Hon. Mr. Maclean, April 16, 1919.
Printed for distribution and sessional papers.

38. Report of the Department of the Naval Service, for the fiscal year ending 31st March, 1918. Presented by Hon. Mr. Maclean, February 28, 1919.
Printed for distribution and sessional papers

39. Fifty-first Annual Report of the Fisheries Branch of the Department of the Naval Service, 1918. Presented by Hon. Mr. Maclean, February 28, 1919.
Printed for distribution and sessional papers.

40. Report of the Joint Librarians of Parliament. Presented by Hon. Mr. Speaker, February 20, 1919.. . . . . *Not printed.*

41. Communication received by the Clerk of the House conveying to the House of Commons of Canada a resolution adopted by the Cnstitutional Congress of the Republic of Costa Rica setting forth the joy of the people of Costa Rica upon the termination of the war and the triumph of the allied arms. Presented by Hon. Mr. Speaker, 1919.
Not printed.

42. Copy of Order in Council, P.C. 1891, dated 14th August, 1918, *re* Regulations relative to the certificates of Masters and Mates.—(*The Senate.*) . . . . . *Not printed.*

43. Statement of the leases of wharves, piers or breakwaters, under the control of the Minister of Marine and Fisheries, and on the conditions of these leases as issued under Chapter 17 of the Statutes of 1909, by the said minister.—(*The Senate.*) . . . . . *Not printed.*

44. Statement of harbour dues collected during the fiscal year 1917-18, in accordance with the provisions of Section 859 of Chapter 113, of the Revised Statutes of Canada, 1906.—(*The Senate.*) . . . . . *Not printed.*

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45. Statement of fees received on account of Sick Mariners' Fund during the fiscal year 1917-18, in accordance with the provisions of Section 387 of Chapter 113, of the Revised Statutes of Canada, 1906.—(*The Senate.*) . . . . . *Not printed.*

46. Copies of General Orders promulgated to the Militia for the period between 1st January, 1918, and 2nd February, 1919. Presented by Hon. Mr. Mewburn, February 26, 1919. *Not printed.*

47. Copies of all Routine Orders of the Canadian Expeditionary Force promulgated from 2nd January, 1918, to 22nd February, 1919. Presented by Hon. Mr. Mewburn, February 26, 1919 . . . . . *Not printed.*

48. Copy of a despatch from the Right Hon. the Secretary of State for the Colonies to His Excellency the Governor General, transmitting copies of a parliamentary paper containing extracts from the minutes of the proceedings of the Imperial War Conference, 1918, and papers laid before the conference. Presented by Hon. Mr. Rowell, February 26, 1919 . . . . . *Not printed.*

49. Statement showing appropriation account of the Royal Northwest Mounted Police, 1917-18, in accordance with Chapter 91, Section 27, of the Revised Statutes. Presented by Hon. Mr. Rowell, February 26, 1919 . . . . . *Not printed.*

49*a*. Copy of Orders in Council, as follows:—

P.C. 1287, dated 25th May, 1918,—Leave of absence for members of the force overseas.

P.C. 2213, dated 7th October, 1918,—Prohibiting members of the Royal Northwest Mounted Police from becoming associated with any trades union organization.

P.C. 3076, dated 12th December, 1918,—Increasing the force of the Northwest Mounted Police to its authorized strength of 1,200, etc.

P.C. 3175, dated 24th December, 1918,—Increased pay to non-commissioned officers and men of the Royal Northwest Mounted Police.

P.C. 159, dated 27th January, 1919,—Transfer of the control of the registration of alien enemies for the provinces of Manitoba, British Columbia, Saskatchewan, Alberta, and that part of Ontario in Military District No. 10. Presented by Hon. Mr. Rowell, February 28, 1919 . . . . . *Not printed.*

50. Copies of Orders in Council, as follows:—

P.C. 2206, dated 12th September, 1918,—Extension of scope of Department of Public Information.

P.C. 2208, dated 12th September, 1918,—Appointment of Dr. George H. Locke as Associate Director of Public Information. Presented by Hon. Mr. Rowell, February 26, 1919 . . . . . *Not printed.*

50*a*. Return to an Order of the House of the 24th March, 1919, for a return showing:—1. The duties of the Department of Public Information. 2. What publication it issues. 3. The annual cost of the department. 4. The names of the men employed, their former occupations and present salaries. 5. The number of newspaper men employed by the said department. Presented March 31, 1919.—*Mr. Pedlow* . . . . . *Not printed.*

50*b*. Return to an Order of the House of the 19th March, 1919, for a return showing the names of all persons employed up to 1st March, 1919, in the Department of Public Information, the class of work each person is doing, the salary or wages paid, the living or other expenses paid, and the former occupation of each person, along with a statement showing what other work, if any, said person was employed in. Presented April 1, 1919.—*Mr. Proulx* . . . . . *Not printed.*

51. Copies of Orders in Council passed since last session of parliament in respect to emergency legislation, as follows:—

P.C. 1187, dated 18th May, 1918.—Requests War Trade Board to communicate with responsible persons with a view to increasing the production of pig-iron in Canada on the basis of a government guarantee for the purchase of the product for a series of years and to report.

P.C. 1507, dated 15th June, 1918,—Prohibits exportation of leather except under license.

P.C. 1525, dated 22nd June, 1918,—Authorizes War Trade Board to negotiate with a responsible company from British Columbia to be formed, to establish a blast furnace and manufacture pig-iron.

P.C. 1798, dated 27th July, 1918,—Approves regulations amending the regulations of the 15th March, 1918, respecting the price of coal and importation, etc, thereof, as to method of calculating overhead charges to determine the cost price of coal, etc.

P.C. 2022, dated 16th August, 1918,—Authorizes Fuel Controller to make regulations subject to the approval of the Governor General in Council governing the price of gasolene and fuel oil and the production, distribution, sale, etc., thereof, and to make any necessary investigation.

CONTENTS OF VOLUME 10—*Continued.*

P.C. 2095, dated 3rd September, 1918,—Empowers War Trade Board to control and regulate the production and distribution of iron and steel and the products thereof, and to make orders to increase the production thereof and if necessary to place government orders or give assistance subject to the approval of the Governor in Council

P.C. 2136, dated 3rd September, 1918,—Authorizes bounties on linen yarns spun in Canada from Canadian flax in the three years beginning 1st April, 1919, and ending 31st March, 1922

P.C. 2153, dated 5th September, 1918,—Further amends the Order in Council of the 11th June, 1917, creating and giving powers to the Board of Grain Supervisors.

P.C. 2370, dated 2nd October, 1918,—Approved regulations as to gasolene respecting permits to dealers and retail prices and prohibiting retail sale on Sunday.

P.C. 2483, dated 9th October, 1918,—Approves regulations and agreement submitted by Board of Grain Supervisors respecting chartering and marine insurance on grains until the close of navigation. Presented by Hon. Mr. Maclean, February 26, 1919.. .. ..*Not printed.*

51*a*. Orders in Council:—

P.C. 2158, dated the 6th September, 1918,—Making regulations governing inspection of bituminous coal and lignite in Canada.

P.C. 2228, dated the 12th September, 1918,—Making regulations governing the distribution of industrial coal in Canada.

P.C. 2268, dated the 13th September, 1918,—Extending the powers of the Fuel Controller.

P.C. 3004, dated the 5th December, 1918,—Amending and consolidating regulations made by the Fuel Controller.

P.C. 3037, dated the 24th December, 1918,—Authorizing inquiries into the project of obtaining increased production of coal in the province of Nova Scotia.

P.C. 1690, dated the 12th July, 1918,—Contract between the Government and the Midland Iron and Steel Company.

P.C. 1712, dated the 18th July, 1918,—Contract between the Government and the Parry Sound Iron Company.

P.C. 122, dated the 17th January, 1919,—Authorizing certain payments on the production of pig-iron.

P.C. 399, dated the 24th February, 1919,—Authorizing certain payments to be made on the production of malleable iron.

P.C. 2058, dated the 22nd August, 1918,—Arrangements for the financing of the importations of New Zealand and Australian wool.

P.C. 3010, dated the 6th December, 1919,—Constituting the Canadian Trade Commission.

P.C. 2734, dated the 7th November, 1918,—Constituting the London Trade Mission.

P.C. 2595, dated the 21st October, 1918,—Constituting the economic commission to Siberia.

P.C. 344, dated the 20th February, 1919,—With respect to the arrangements entered into with the Siberian Supply Company. Presented by Hon. Mr. Maclean, February 3, 1919.. .. ..*Not printed.*

52. Copies of Orders in Council, as follows:—

P.C. 81-1380, dated 3rd June, 1918. Allowance in lieu of medical allowance.

P.C. 86-1513, 20th June, 1918. Rates of pay.

P.C. 1575, 2nd July, 1918. Increases in pay.

P.C. 2225, 12th September, 1918. Allowances for accountant officers of depot ships.

P.C. 2707, 6th November, 1918. Rates of pay, R.C.N.S.

P.C. 2893, 23rd November, 1918. Provisional allowance.

P.C. 1313, 3rd June, 1918. Amendment Defence of Canada Order.

P.C. 1075, 6th June, 1918. Amendment Defence of Canada Order.

P.C. 2275, 13th September, 1918. Amendment Defence of Canada Order.

P.C. 2626, 26th October, 1918. Issue of war badges.

P.C. 2868, 21st November, 1918. Separation allowance.

P.C. 269, 9th February, 1919. Issue of war badges. Presented by Hon. Mr. Ballantyne, February, 1919.. .. ..*Not printed.*

52*a*. Copy of Orders in Council:—

P.C. 1313, dated 3rd June, 1918,—Amendment, Defence of Canada Order.

P.C. 1075, dated 6th June, 1918,—Amendment, Defence of Canada Order.

P.C. 2257, dated 13th September, 1918,—Amendment, Defence of Canada Order.

P.C. 2626, dated 26th October, 1918,—Issue of war badges.

P.C. 2868, dated 21st November, 1918,—Separation allowance.

P.C. 269, dated 9th February, 1919,—Issue of war badges.

P.C. 81-1380, dated 3rd June, 1918,—Allowance in lieu of medical allowance.

P.C. 86-1513, dated 20th June, 1918,—Rates of pay.

P.C. 1575, dated 2nd July, 1918,—Increase in pay.

P.C. 2225, dated 12th September, 1918,—Allowances for accountant officers of depot ships.

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P.C. 2707, dated 6th November, 1918,—Rates of pay, R.C.N.S.
P.C. 2893, dated 23rd November, 1918,—Provisional allowance. Presented by Hon. Mr. Maclean, February 28, 1919.......................... *Not printed.*

52*b*. Copy of Order in Council, P.C. 565, dated 14th March, 1919: Separation allowances in Canadian Naval Service. Presented by Hon. Mr. Maclean, March 20, 1919. *Not printed.*

52*c*. Copy of an Order in Council, P.C. 589, dated the 19th March, 1919,—Cancellation of certain sections of the Defence of Canada Order, 1917. Presented by Hon. Mr. Maclean, March 27, 1919.......................... *Not printed.*

52*d*. Copy of Order in Council P.C. 778, dated 9th April, 1919, *re* uniform allowance to nursing sisters of the Royal Canadian Navy. Presented by Hon. Mr. Maclean, April 16, 1919. *Not printed.*

52*e*. Amendments to Radiotelegraph Regulations: Private Commercial Licenses. Emergency Certificates. Presented by Hon. Mr. Ballantyne, May 1, 1919.......... *Not printed.*

52*f*. Radiotelegraph Regulations:—Issue of licenses for amateur stations. Fees for examinations for Emergency Certificates for Proficiency. Presented by Hon. Mr. Ballantyne, May 6, 1919.......................... *Not printed.*

52*g*. Copy of Order in Council, P.C. 1038, dated 19th May, 1919, respecting the Department of the Naval Service: Issue of war badges. Presented by Hon. Mr. Ballantyne, May 27, 1919.......................... *Not printed.*

52*h*. Order in Council P.C. 1172, dated 6th June, 1919, respecting issue of war badges.—(*The Senate.*).......................... *Not printed.*

52*i*. Copy of Order in Council, P.C. 1222, dated 14th June, 1919, respecting war bonus to officers and men in the Canadian navy. Presented by Hon. Mr. Ballantyne, July 2, 1919. *Not printed.*

53. Copies of Orders in Council respecting housing: P.C. 2997, dated 3rd December, 1918, P.C. 3067, dated 12th December, 1918. P.C. 374, dated 20th February, 1919. Presented by Hon. Mr. Rowell, February 27, 1919.......................... *Not printed.*

53*a*. Copy of Order in Council, P.C. 907, dated 1st May, 1919, approving of the General Housing Scheme of the Province of British Columbia. Presented by Hon. Mr. Rowell, May 6, 1919.......................... *Not printed.*

53*b*. Copy of Order in Council, P.C. 1130, dated 29th May, 1919, approving of the General Scheme of Housing of the Province of Quebec. Presented by Hon. Mr. Rowell, June 2, 1919.......................... *Not printed.*

53*c*. Copy of Order in Council, P.C. 1201, dated 11th June, 1919, approving General Scheme of Housing of the Province of Manitoba. Presented by Hon. Mr. Rowell, June 13, 1919.......................... *Not printed.*

53*d*. Copy of Order in Council, P.C. 1266, dated 23rd June, 1919, approving the General Scheme of Housing of the Province of New Brunswick. Presented by Hon. Mr. Rowell, June 24, 1919.

54. P.C. 3176, dated 24th December, 1918,—Resumption of work upon those sections of the Welland Ship Canal which had been already commenced and partly completed on a percentage basis.
P.C. 3036,—Welland Ship Canal; authorizing resumption of work thereon.
P.C. 3190, dated 27th December, 1918,—Amendment of Order in Council, P.C. 3176, dated 24th December, 1918,—Welland canal contracts with firm of which Senator M. J. O'Brien was formerly a member. Presented by Hon. Mr. Reid, February 28, 1919 *Not printed.*

54*a*. Copies of contracts between His Majesty the King and the Dominion Dredging Company, Limited; Baldry, Yerburgh and Hutchison, Limited: Doheny, Quinlan and Robertson; and Canadian Dredging Company, Limited, dated 17th January, 1919, in respect to the carrying on of certain work in connection with the Welland Ship Canal. Presented by Hon. Mr. Reid, April 23, 1919.......................... *Not printed.*

55. P.C. 3000, dated 5th December, 1918,—Improvement of highways, and appointment of Mr. A. W. Campbell, M. Can. Soc. C.E., in connection therewith. Presented by Hon. Mr. Reid, February 28, 1919.......................... *Not printed.*

56. P.C. 3083, dated 19th December, 1918,—Resumption of work on the Severn Division of the Trent canal; agreement with the York Construction Company on a percentage basis.
P.C. 3084, dated 19th December, 1918,—Contract with the Randolph MacDonald Company for the construction of Section No. 3 of the Severn Division of the Trent canal on a percentage basis. Presented by Hon. Mr. Reid, February 28, 1919. *Not printed.*

CONTENTS OF VOLUME 10—*Continued.*

57. P.C. 2854, dated 20th November, 1918,—Persons composing Board of Directors of the Canadian Northern Railway Company to be from time to time also Board of Management of the Canadian Government Railways.

P.C. 2454, dated 4th October, 1918,—Purchase of balance of capital stock of the Canadian Northern Railway Company.

P.C. 2331, dated 23rd September, 1918,—Acquirement of the Toronto Suburban Railway Company and the Toronto Eastern Railway Company by the Directors of the Canadian Northern Railway Company.

P.C. 3182, dated 27th December, 1918,—Transfer of two wharves (ocean piers Nos. 2 and 3), at Ogden Point, Victoria, B.C., to the control of the Board of Directors of the Canadian Northern Railway.

P.C. 3122, dated 20th December, 1918,—Authorizing the use of the name "Canadian National Railways," in lieu of the names Canadian Northern Railway System and Canadian Government Railways.

P.C. 3120, dated 20th December, 1918,—Equipment requirements for the year 1919, covering the Canadian Northern Railway System and the Canadian Government Railways.

P.C. 3121, dated 20th December, 1918,—Authorizing the directors of the Canadian Northern Railway to incur expenditures for work urgently required on the Canadian Northern Railway or Government Railways System, not to exceed in all ten million dollars.

P.C. 2111, dated 30th August, 1918,—Acquiring branch lines in New Brunswick as feeders to the Government Railway System.

P.C. 182, dated 29th January, 1919,—Government wharf at Vancouver, B.C., removed from the control of the Vancouver Harbour Commissioners to that of the Department of Railways and Canada.

P.C. 1691, dated 5th July, 1918,—Loan to Canadian Northern Railway Company. Presented by Hon. Mr. Reid, February 28, 1919.. .. ..*Not printed.*

58. P.C. 117, dated 20th January, 1919,—Engineering data on the construction of the Quebec Bridge to be printed for distribution. Presented by Hon. Mr. Reid, February 28, 1919.. .. ..*Not printed.*

59. P.C. 1768, dated 16th July, 1918,—Wage increase on Canadian Railways; increase in freight rates on Canadian Railways. Presented by Hon. Mr. Reid, February 28, 1919. *Not printed.*

60. Report of the Canada Food Board, 1918. Presented by Hon. Mr. Crerar, February 28, 1919.. .. ..*Not printed.*

61. Regulations under "The Destructive Insect and Pest Act," pursuant to Section 9, Chapter 31 of 9-10 Edward VII. Presented by Hon. Mr. Crerar, February 28, 1919..*Not printed.*

62. Copy of the Judgment and Reasons of the Supreme Court of Canada in the case of George Edwin Gray, *Habeas Corpus* proceedings. Presented by Sir Thomas White, February 28, 1919.. .. ..*Not printed.*

63. P.C. 113, dated 17th January, 1919,—Prohibiting the import and export of Russian roubles. Presented by Sir Thomas White, February 28, 1919.. .. ..*Not printed.*

64. P.C. 3188, dated 14th January, 1919,—Repealing restrictions on issue of securities and shares. Presented by Sir Thomas White, February 28, 1919.. .. .. ..*Not printed.*

65. P.C. 3208, dated 2nd January, 1919,—Respecting credit to Imperial Government for purchase of timber in Canada. Presented by Sir Thomas White, February 28, 1919. *Not printed.*

66. P.C. 2355, dated 25th September, 1918,—Respecting the National War Savings Committee. Presented by Sir Thomas White, February 28, 1919.. .. ..*Not printed.*

67. P.C. 2740, dated 7th November, 1918,—Placing potatoes on free list. Presented by Sir Thomas White, February 28, 1919.. .. ..*Not printed.*

68. P.C. 2089, dated 24th August, 1918,—Prohibiting export of silver. Presented by Sir Thomas White, February 28, 1919.. .. ..*Not printed.*

69. P.C. 1354, dated 3rd June, 1918,—Prohibiting export of gold. Presented by Sir Thomas White, February 28, 1919.. .. ..*Not printed*

70. P.C. 2001, dated 14th August, 1918,—Respecting undertaking with banks in connection with 1918 wheat crop. Presented by Sir Thomas White, February 28, 1918 .. ..*Not printed.*

71. P.C. 2058, dated 22nd August, 1918,—Respecting advances for purchase of wool. Presented by Sir Thomas White, February 28, 1919.. .. ..*Not printed.*

72. P.C. 179, dated 29th January, 1919,—Repatriation of soldiers' dependents. Presented by Sir Thomas White, February 28, 1919.. .. ..*Not printed.*

CONTENTS OF VOLUME 10—*Continued.*

73. P.C. 2823, dated 15th November, 1918,—Establishment of a sub-committee of Council, dealing with demobilization questions and industrial labour conditions. Presented by Sir Thomas White, February 28, 1919.. .. ..*Not printed.*

74. P.C. 2798, dated 15th November, 1918,—Establishing a Power Sub-Committee of the Cabinet. Presented by Sir Thomas White, February 28, 1919.. .. ..*Not printed.*

75. P.C. 2734, dated 7th November, 1918,—Establishing the Canadian Trade Mission in London. Presented by Sir Thomas White, February 28, 1919.. .. ..*Not printed.*

76. P.C. 2270, dated 16th September, 1919,—Establishment of "The Paper Control Tribunal."

P.C. 2310, dated 19th September, 1918,—Appointment of three judges to be members of "The Paper Control Tribunal."

P.C. 2581, dated 19th October, 1918,—Licenses for export of paper. Presented by Sir Thomas White, February 28, 1919.. .. ..*Not printed.*

76*a*. Copies of Orders in Council respecting the quantity and price of newsprint to be furnished by the manufacturers to the publishers in Canada, from the 7th February, 1917, to 11th November, 1918, inclusive. Presented by Sir Thomas White, July 3, 1919.. .. ..*Not printed*

77. P.C. 1222, dated 18th May, 1918,—Amalgamating and combining the Department of Customs and Inland Revenue. Presented by Sir Thomas White, February 28, 1919. *Not printed.*

78. And also,—Copy of Mr. Justice Hodgins' Report on the *Northland* inquiry. Presented by Sir Thomas White, February 28, 1919.. .. ..*Not printed.*

79. P.C. 968, dated 25th May, 1918,—Regulations *re* Documents to be carried.

P.C. 1325, dated 29th May, 1918,—Reward for apprehension of deserters.

P.C. 1305, dated 5th June, 1918,—Control of Dominion Police Force transferred to Department of Militia and Defence. Remuneration of members and establishment of Force.

P.C. 1459, dated 12th June, 1918,—Natives of India of unmixed Asiatic descent and their descendants exempt from military service.

P.C. 1490, dated 15th June, 1918,—Amendment to Section 1, Paragraph (a) of 30th April, 1918,—Documents to be carried.

P.C. 1567, dated 22nd June, 1918,—Amendments to Sections 4 and 5, P.C. 919, 20th April, 1918. Cancelling exemption to all members of Class 1 who at the date of the claim for exemption made by or on their behalf gave their ages as 20, 21 or 22.

P.C. 1697, dated 5th July, 1918,—Men whose exemptions were cancelled by virtue of P.C. 919 of 20th April, 1918, to be dealt with as provided by that Order in Council, notwithstanding judgment of Supreme Court of Alberta.

P.C. 1647, dated 12th July, 1918,—Regulation *re* issue of temporary exemption certificate.

P.C. 1795, dated 17th July, 1918,—Hearing by Supreme Court of case of George Edwin Gray.

P.C. 1850, dated 27th July, 1918,—Regulation *re* discharge of members of C.E.F. to R.F.C. and R.A.F.

P.C. 1851, dated 27th July, 1918,—Regulation *re* duties of man who becomes resident of Canada after class of which he is a member has been called out.

P.C. 1931, dated 1st August, 1918,—Draft Proclamation *re* amnesty to deserters and defaulters.

P.C. 1906, dated 5th August, 1918,—Penalty for employing, concealing or assisting deserter or absentee without leave, Section 106, Regulations amended.

P.C. 1907, dated 5th August, 1918,—American Convention enforced from July 30, 1918.

P.C. 1953, dated 10th August, 1918,—Regulations *re* 100,000 limit.

P.C. 2044, dated 20th August, 1918,—Regulations of American Convention.

P.C. 2017, dated 3rd September, 1918,—Provision for certain British subjects who are also subjects of Neutral State making declaration of alienage during war. Regulation 11 amended.

P.C. 2138, dated 5th September, 1918,—Regulation amending clause "C," Section 1 of P.C. 1013 of April 30, 1918, in so far as the Provinces of Manitoba, Saskatchewan and Alberta are concerned.

P.C. 2242, dated 13th September, 1918,—Penalty for giving false or misleading information on questionnaire and for failure to return questionnaire within the prescribed time. Section 93 Regulations amended.

P.C. 2243, dated 13th September, 1918,—Penalty for attempting to bribe any person connected with administration of Act.

P.C. 2252, dated 13th September, 1918,—Additional powers conferred on the Chief Commissioner of Dominion Police.

CONTENTS OF VOLUME 10—*Continued.*

P.C. 2122, dated 19th September, 1918,—Documents to be carried (P.C. 1013 of the 30th April, 1918, P.C. 1226, of the 20th May, 1918, and P.C. 1490 of the 15th June, 1918, amended).

P.C. 2320, dated 19th September, 1918,—Powers conferred on the Chief Commissioner of Dominion Police (P.C. 1852, 27th July, 1918, amended).

P.C. 2410, dated 28th September, 1918,—Regulation *re* extension of time for laying a complaint for an offence punishable on summary conviction under the authority of the War Measures Act, 1914.

P.C. 2452, dated 4th October, 1918,—Order to report for medical examination (Section 1, paragraph "m" Regulations amended).

P.C. 2453, dated 4th October, 1918,—Sections 81, 82, 106 Regulations amended.

P.C. 2517, dated 11th October, 1918,—Regulations *re* change of occupation during winter months.

P.C. 2492, dated 12th October, 1918,—Penalty for concealing or assisting deserter or absentee without leave (Regulation 106 amended).

P.C. 2553, dated 17th October, 1918,—The issue under the signature of the Central Appeal Judge or the Clerk to the Central Appeal Judge or the Judge of any Appeal Tribunal of certified copies or certificate as to records, proceedings or decisions in their respective offices and such copies or certificate shall be receivable in evidence.

P.C. 2585, dated 23rd October, 1918,—In case of man who fails to report for duty or for medical examination as ordered by Registrar, certificate of Registrar to be accepted as evidence. P.C. 3168, 9th November, 1917, amended.

P.C. 2586, dated 23rd October, 1918,—Regulation *re* person who fails to report to the Registrar as required by P.C. 919 of 20th April, 1918, or by the Proclamation of 6th May, 1918, shall be deemed to be a soldier absent without leave from midnight of the last day limited for reporting.

P.C. 2587, dated 23rd October, 1918,—Duty of employer to give certain information. Penalty for failure. P.C. 510, 2nd March, 1918, amended.

P.C. 2588, dated 23rd October, 1918,—Registrar empowered to determine any application for renewal of exemption.

P.C. 2622, dated 25th October, 1918,—Regulations *re* Mennonites and Doukhobors.

P.C. 2631, dated 26th October, 1918,—Franking privilege extended to the Clerk of the Central Appeal Judge.

P.C. 2632, dated 26th October, 1918,—Penalty for failure to attend to medical examination. Section 104 Regulations amended.

P.C. 2658, dated 30th October, 1918,—Regulations *re* discharge from C.E.F. to R.F.C. and R.A.F. P.C. 1850, 27th July, 1918, amended.

P.C. 2694, dated 2nd November, 1918,—Regulations *re* identification of persons excepted from Military Service, etc.

P.C. 2828, dated 15th November, 1918,—Rescinding Order in Council, P.C. 1433, dated 24th May, 1917, *re* exodus from Canada of persons likely to be affected by the Military Service Act.

P.C. 3051, dated 11th December, 1918,—Discharge of men belonging to Class 1 who could not be usefully employed in the C.E.F. by reason of low category.

P.C. 3090, dated 16th December, 1918,—Proceedings in relation to applications for exemption to be suspended during the armistice.

P.C. 3107, dated 17th December, 1918,—Regulations *re* transfer of prisoners from one prison to another when accommodation is not sufficient.

P.C. 3211, dated 2nd January, 1919,—Regulations *re* procedure against deserters and persons absent from Military Service without leave, amended.

P.C. 101, dated 16th January, 1919,—Regulations *re* failing to report for duty. Certificate of Registrar to be accepted as evidence.

P.C. 102, dated 16th January, 1919,—Regulations *re* reward for apprehension of deserters.

P.C. 293, dated 12th February, 1919,—Prosecutions under Section 16, Sub-section of the Military Service Act, 1917. Consent of Minister of Justice, etc.

P.C. 314, dated 12th February, 1919,—Regulations *re* deserters and absentees without leave may be delivered into military custody. Trial of such persons. Presented by Hon. Mr. Meighen, February 28, 1919.. .. ..*Not printed.*

79*a*. Copies of Orders in Council in respect to Militia and Defence and the Canadian Expeditionary Forces. Presented by Hon. Mr. Mewburn, March 4, 1919.. .. ..*Not printed.*

80. Copy of a General Order of the Supreme Court, adopted on the 8th October, 1918, amending certain Rules of the Supreme Court of Canada. Presented by Hon. Mr. Meighen, February 28, 1919.. .. ..*Not printed.*

81. Copy of a Parliamentary Paper (C.D. 9212) containing the conditions of the Armistice with Germany, received by His Excellency the Governor General from the Secretary of State for the Colonies, together with a copy of a telegram from His Majesty's Ambassador at Paris, on the subject of the extension of the Armistice with Germany. Presented by Hon. Mr. Rowell, February 28, 1919.. .. ..*Not printed.*

CONTENTS OF VOLUME 10—*Continued.*

81a. *Also,*—Copy of the terms of the Armistice with Turkey and of the Armistice with Austria-Hungary, received by His Excellency the Governor General from the Secretary of State for the Colonies. Presented by Hon. Mr. Rowell, February 28, 1919. *Not printed.*

81b. Copy of a letter from the Secretary of State for the Colonies, to His Excellency the Governor General, of the 25th of February, 1919, transmitting copies of the Convention signed on the 16th January, 1919, prolonging the Armistice with Germany, together with copies of the Financial Protocol of the 13th of December, 1918. Presented by Hon. Mr. Rowell, March 18, 1919.. .. ..*Not printed.*

81c. Copy of a pamphlet received from the Secretary of State for the Colonies, intituled: "Terms of the Armistice concluded between the allied Governments and the Governments of Germany, Austria-Hungary and Turkey. Presented by Hon. Mr. Rowell, May 5, 1919.. .. ..*Not printed.*

82. Statement of Wharfage Collections for the fiscal year 1917-18, in accordance with the provisions of Chapter 112, Section 14, Revised Statutes, 1906. Presented by Hon. Mr. Maclean, February 28, 1919.. .. ..*Not printed.*

83. Statement of Superannuation and Retiring Allowances in the Civil Service during the year ending 31st December, 1918, showing name, rank, salary, service allowance and cause of retirement of each person superannuated or retired, also whether vacancy has been filled by promotion, or by appointment, and the salary of any new appointee. Presented by Sir Thomas White, March 3, 1919.. .. ..*Not printed.*

84. Statement in pursuance of Section 17 of the Civil Service Insurance Act, for the year ending March 31, 1918. Presented by Sir Thomas White, March 3, 1919. ..*Not printed.*

85. Statement of Governor General's Warrants issued since the last Session of Parliament on account of 1918-19. Presented by Sir Thomas White, March 3, 1919..*Not printed.*

86. Statement of the Receipts and Expenditures of the Royal Society of Canada, for the year ended April 30, 1918. Presented by Sir Thomas White, March 3, 1919. *Not printed.*

87. Statement of Receipts and Expenditures of the National Battlefields Commission to 31st March, 1918. Presented by Sir Thomas White, March 3, 1919.. .. .. ..*Not printed.*

88. Statements of Expenditure on account of "Miscellaneous Unforeseen Expenses," from the 1st April, 1918, to the 21st February, 1919, in accordance with the Appropriation Act of 1918. Presented by Sir Thomas White, March 3, 1919.. .. ..*Not printed.*

89. Statement of Temporary Loans issued by the Government of Canada since the last Session of Parliament still outstanding. Presented by Sir Thomas White, March 3, 1919.. .. ..*Not printed.*

90. Report of the Ottawa Improvement Commission for the fiscal year ended March 31, 1918, including a summary of the receipts and expenditures from its inception in August, 1899, to March 31, 1918. Presented by Sir Thomas White, March 3, 1919...*Not printed.*

91. Statement of Treasury Board over-ruling, under Section 44, Consolidated Revenue and Audit Act. Presented by Sir Thomas White, March 3, 1919.. .. .. ..*Not printed.*

92. P.C. 1743, dated 11th July, 1918,—Declaring principles and policies *re* industrial disputes and urging their adoption upon employers and employees for the duration of the war.

P.C. 2195, dated 12th September, 1918,—*Re* Employment Offices Co-ordination Act. Submitting form of agreement to be entered into with the provinces.

P.C. 2333, dated 23rd September, 1918,—*Re* Canada Registration Board. Requiring certain returns from employers.

P.C. 2461, dated 4th October, 1918,—*Re* Cost of Living. Rescinding previous Orders owing to certain defects therein and making regulations.

P.C. 2525, dated 11th October, 1918,—*Re* Industrial Disputes Investigation Act. Prohibition of strikes in war industries.

P.C. 2808, dated 19th November, 1918,—Repealing Order in Council No. 2525.

P.C. 3069, dated 11th December, 1918,—*Re* Cost of Living. Rescinding Order in Council No. 2461 and making regulations.

P.C. 3111, dated 17th December, 1918,—*Re* Employment Offices Co-ordination Act. Providing regulations thereunder.

P.C. 3171, dated 24th December, 1918,—*Re* Employment Offices Co-ordination Act. Providing for establishment and maintenance of certain employment bureaus.

P.C. 17, dated 6th January, 1919,—*Re* Employment Offices Co-ordination Act. Making regulations as to employment returns.

P.C. 39, dated 11th January, 1919,—Employment offices Co-ordination Act. Providing for cost of maintenance of certain employment offices from War Appropriation. Presented by Hon. Mr. Maclean, March 3, 1919.. .. ..*Not printed.*

CONTENTS OF VOLUME 10—*Continued.*

93. Copy of a cable (in extended form) received by His Excellency the Governor General from the Secretary of State for the Colonies on February 14, 1919, giving a summary of the League of Nations Covenant presented to the Peace Conference by the League of Nations Commission. Presented by Hon. Mr. Rowell, March 3, 1919. *Not printed.*

93*a*. Copy of a letter received by His Excellency the Governor General from the Secretary of State for the Colonies, dated February 28, 1919, with accompanying printed copies of the draft League of Nations Covenant. Presented by Hon. Mr. Rowell, March 24, 1914.. .. ..*Printed for distribution and sessional papers.*

93*b*. Copy of the revised draft of the League of Nations Covenant, as approved by the Peace Conference in plenary session on April 28, 1919. Presented by Hon. Mr. Rowell, May 5, 1919.. .. ..*Printed for distribution and sessional papers.*

94. Order in Council, dated 5th November, 1918, with regard to remissions made under Section 88 of The Indian Act, Chapter 81, R.S.C. 1906. Presented by Hon. Mr. Meighen, March 4, 1919.. .. ..*Not printed.*

95. P.C. 2860, 20th November, 1918, providing for the issue of supplementary letters patent, in favour of the present owners of certain lands, conveying the right to the clay which may be found therein.

P.C. 2827, 20th November, 1918, providing that the pre-emption entry of Omer Lethiecq be cancelled and sold to his wife, he having been sentenced to serve 12 years in the Prince Albert penitentiary.

P.C. 2842, 20th November, 1918, ordering that further residence by Ben Henry, holding homestead and pre-emption entries for certain Dominion Lands, be dispensed with owing to his ill-health and consequent inability to perform further residence duties.

P.C. 2841, 20th November, 1918, ordering that further residence on the part of Lucy Knott, an entrant under a South African Volunteer Scrip grant, be dispensed with as she is unable to perform further residence owing to ill-health.

P.C. 2941, 29th November, 1918, providing for the confirmation of an exchange of lands with the Hudson's Bay Company, and granting the land so exchanged to Sam Doubuch (Dowbuch) upon certain terms and conditions.

P.C. 42-2993, 3rd December, 1918, setting apart and appropriating certain land for cemetery purposes and authorizing a grant thereof for the said purposes.

P.C. 43-2993, 3rd December, 1918, setting apart and appropriating certain land for church purposes, and authorizing a grant thereof.

P.C. 3102, 17th December, 1918, transferring control of certain land to the Royal Northwest Mounted Police.

P.C. 3103, 17th December, 1918, providing for the issue of patent to Samuel Ingram in lieu of land surrendered by Mr. Ingram, which is unsuitable for agricultural development and has been reserved for inclusion in a forest reserve.

P.C. 3115, 21st December, 1918, ordering that title to certain Dominion Lands be vested in George F. Green in lieu of land surrendered by Mr. Green, which has been recommended for inclusion in a forest reserve.

P.C. 3192, 27th December, 1918, providing for the leasing of a tract of land to a company cutting clay which has been found to be suitable for use in connection with the manufacture of cement.

P.C. 31-27, 7th January, 1919, rescinding an Order in Council of the 15th February, 1911, and setting apart certain land in the Province of Alberta for exhibition grounds and experimental station purposes, and authorizing a grant thereof.

P.C. 38-27, 7th January, 1919, authorizing a grant of land to the Synod of the Diocese of Athabasca.

P.C. 3200, 14th January, 1919, making regulations for the drainage of Dominion Lands in the Provinces of Alberta and Saskatchewan.

P.C. 134, 20th January, 1919, providing for the issue of a permit to a company to remove earth for the purpose of filling in a trestle, and the payment of a royalty therefor.

P.C. 2459, 7th October, 1918, recommending that further residence duties be waived and authority given for the issue of patents for Dominion Lands in the case of John S. Reid, permanently disabled through illness.

P.C. 2460, 7th October, 1918, authorizing the issue of a license of occupation for the bed of the Peace River at a certain place, in favour of the Edmonton-Dunvegan and British Columbia Railway Company.

P.C. 2484, 9th October, 1918, authorizing the issue of a license of occupation for a portion of the bed of the Assiniboine River in favour of the Canadian Northern Railway Company.

P.C. 2557, 19th October, 1918, ordering that the land covered by a certain road be transferred to the Crown in the right of the Province of Manitoba.

P.C. 2583, 23rd October, 1918, authorizing a free grant of land to Thomas Gladu by virtue of occupancy thereof at the date of the extinguishment of the Indian title.

CONTENTS OF VOLUME 10—*Continued.*

P.C. 2623, 25th October, 1918, authorizing a free grant of land to Peter Loutit, the Elder, by virtue of occupation thereof at the date of the extinguishment of the Indian title.

P.C. 2642, 26th October, 1918, setting apart and expropriating certain Dominion Lands for church purposes, and authorizing a grant thereof to the Russo-Greek Orthodox Parish of Torpontz.

P.C. 2659, 30th October, 1918, ordering that cerain lands be set apart for Soldier Settlement under certain conditions.

P.C. 2678, 2nd November, 1918, providing that the residence requirements of the Dominion Lands Act be dispensed with in connection with the homestead entry ot George Young, who is unable through illness to complete the requirements.

P.C. 2703, 7th November, 1918, making regulations in reference to the issue of homestead entry to citizens of the United States who are unable to become naturalized.

P.C. 2780, 13th November, 1918, ordering certain land to be withdrawn from a reserve for stock-watering purposes.

P.C. 1911, 5th August, 1918, providing for the exchange of certain lands and a grant of land to Thomas William Ripper, who had made a homestead entry on the Hudson's Bay Lands, the said Hudson's Bay Company having surrendered the land covered by Mr. Ripper's entry, and the granting to the Hudson's Bay Company of certain other land in lieu thereof.

P.C. 1912, 5th August, 1918, confirming an exchange of lands with Mr. Arthur Hitchcock, and authorizing the issue of letters patent in favour of Mr. Hitchcock for certain Dominion Lands exchanged with him.

P.C. 1922, 5th August, 1918, authorizing the Department of the Interior to enter into grazing or other similar leases covering land reserved for the use of the Department of Militia and Defence under certain conditions.

P.C. 6-1992, 17th August, 1918, authorizing a grant of certain Dominion Lands for church and cemetery purposes.

P.C. 2045, 22nd August, 1918, ordering that certain lands be withdrawn from the operation of the Dominion Lands Act, and be set apart as an Indian Reserve.

P.C. 2088, 27th August, 1918, authorizing the Minister to dispense with the performance of residence requirements under the Dominion Lands Act, and the issue of letters patent in favour of William Marshall Vance, a homesteader who had both feet frozen, necessitating amputation .

P.C. .2159, 6th September, 1918, ordering that certain Dominion Lands at Port Smith Settlement be set apart for the use of the Department of Indian Affairs under certain conditions.

P.C. 56-2207, 12th September, 1918, authorizing a grant of certain Dominion Lands in the Province of Saskatchewan for such purposes.

P.C. 2283, 19th September, 1918, rescinding Clause 12 of the regulations governing the granting of yearly licenses and permits to cut timber on Dominion Lands and substituting another Clause therefor, and rescinding Sub-clause (*c*) of Clause 17, and substituting another therefor, making an amendment to Sub-clause (m) of Clause 17, and making an amendment of Sub-clause 41.

P.C. 2302, 19th September, 1918, recommending that certain lands shall be withdrawn from the operation of the Dominion Lands Act, and set apart for the Indians in the Province of British Columbia.

P.C. 2303, 21st September, 1918, ordering that Section 1 of the Coal Mining Regulations, established by Order in Council dated 20th April, 1910, and amendments thereto be rescinded and a new Section substituted therefor, and made to apply to all coal mining leases already issued, and ordering that the maximum charge specified in the above section shall be increased and made to apply to coal mining rights already disposed of, and ordering that Section 24 of the said regulations be rescinded, and a new section substituted therefor, and ordering a further provision to be inserted, as to the methods for the conservation and recovery of coal, and ordering that a further provision be inserted to create educational facilities in certain cases.

P.C. 2371, 25th September, 1918, providing for the transfer of certain Dominion Lands to the School Lands Endowment Fund, and that lands previously included in the School Lands Endowment Fund be granted to the Town of Drumheller for park purposes.

P.C. 26-2427, 28th September, 1918, setting apart and appropriating certain Dominion Lands for church purposes in the Province of Alberta.

P.C. 2399, 30th September, 1918, ordering that certain lands be wtihdrawn from the operation of the Dominion Lands Act, and set apart for the Indians in the Province of Saskatchewan.

P.C. 1516, 20th June, 1918, granting a lease of coal mining rights under certain lands to the Cadomin Coal Company, Limited.

P.C. 1510, 20th June, 1918, authorizing the Minister of the Interior to sell certain Dominion Lands to Edmund Thompson for reclamation purposes, and to enter into an agreement with the said Edmund Thompson in connection therewith as representatives of His Majesty King George the Fifth.

CONTENTS OF VOLUME 10—*Continued.*

P.C. 1515, 20th June, 1918, authorizing the issue of a free patent of Dominion Lands to Mrs. Flossie Fitzgerald, who has been deserted by her husband, a homestead entrant, she being totally unfit to fulfil the residence requirements.

P.C. 1511, 20th June, 1918, authorizing Miss Margaret Reith to make entries by proxy on behalf of her nephews, W. J. F. Reith, and J. W. Reith, overseas with the Canadian Expeditionary Force.

P.C. 1586, 28th June, 1918, relieving Mr. George Ross from the performance of any further residence duties on his homestead, and authorizing the issue of a free patent to him under certain conditions, he having been admitted to the House for Incurables at Portage la Prairie, Manitoba.

P.C. 1621, 2nd July, 1918, making regulations in connection with the Soldier Settlement Regulations.

P.C. 1658, 6th July, 1918, withdrawing certain Dominion Lands from the Doukhobor Reserves to be dealt with by the Minister of the Interior, subject to certain regulations.

P.C. 1806, 19th July, 1918, ordering title to certain Dominion Lands to be vested in His Majesty King George the Fifth, as represented by the Minister of Public Works for the Province of Alberta.

P.C. 1807, 19th July, 1918, ordering that a certain parcel of Dominion Lands be transferred to the Department of Public Works.

P.C. 1820, 20th July, 1918, authorizing the Minister of the Interior to issue a license of occupation to the Canadian Northern Railway for a certain portion of the Oldman river bed.

P.C. 1819, 25th July, 1918, ordering that a certain parcel of Dominion Lands be transferred to the Department of Indian Affairs for a cemetery.

P.C. 1822, 25th July, 1918, authorizing the Minister to grant the sale of certain Dominion Lands to Mr. William Armstrong as a mill site.

P.C. 1830, 25th July, 1918, authorizing the Minister to grant permits for free grazing privileges for reindeer in a certain area in the Northwest Territories.

P.C. 1828, 25th July, 1918, authorizing a free grant of certain Dominion Lands to J. I. McLean, by virtue of his occupation of the land at the date of the extinguishment of the Indian title.

P.C. 1827, 25th July, 1918, providing the authorization of an exchange of certain lands with the Canadian Pacific Railway Company, the company releasing certain lands to be applied for the purposes of an extension to the Stony Indian Reserve, and certain other Dominion lands being granted to the company, the difference in area being credited to the company's land grant.

P.C. 1823, 25th July, 1918, providing for the disposal of certain lots in a subdivision near the station of Badger on the Canadian Northern Railway under certain conditions, which land had been squatted on by certain persons.

P.C. 1910, 5th August, 1918, ordering that a certain road be transferred to the Crown in the right of the Province of Manitoba.

P.C. 873, 13th April, 1918, authorizing a free grant of Dominion Lands to Mr. William Robert Smith by virtue of his occupation of the land at the date of the extinguishment of the Indian title.

P.C. 1012, 30th April, 1918, ordering that Order in Council of the 22nd October, 1901, be rescinded and that certain lands be transferred to the control of the Department of the Interior, and made available for disposal in accordance with the provisions of the Dominion Lands Act.

P. C. 1053, 1st May, 1918, making regulations for the protection of game in the Northwest Territories.

P.C. 1003, 1st May, 1918, giving the Minister of the Interior authority to sell certain land to Clay Armstrong, subject to certain conditions, for the purposes of reclamation.

P.C. 1062, 3rd May, 1918, authorizing a free grant of Dominion Lands to the Rural Municipality of Biggar, No. 347, in the Province of Saskatchewan, for cemetery purposes.

P.C. 1002, 7th May, 1918, authorizing the Minister to lease certain Dominion Lands to the Western Canada Collieries Limited, to be used only in connection with the mining operations of the said Company.

P.C. 1088, 7th May, 1918, authorizing the Minister to arrange for certain sales of School Lands at certain points in the Province of Saskatchewan.

P.C. 1004, 7th May, 1918, making certain regulations to be observed by persons wishing to use fire for clearing land in certain districts.

P.C. 1100, 10th May, 1918, setting apart certain lands in the Province of Alberta, and authorizing a grant thereof to the Knoll Cemetery Company.

P.C. 1190, 17th May, 1918, authorizing a grant of Dominion Lands in the Province of Alberta to the Bishop of Mackenzie River, by virtue of his occupation of the land at the date of the extinguishment of the Indian title.

P.C. 1244, 22nd May, 1918, recommending that the residence requirements of the Dominion Lands Act be dispensed with in the case of Charles Blanchard, who was severely burned and badly frost bitten.

CONTENTS OF VOLUME 10—*Continued.*

P.C. 1268, 25th May, 1918, providing a transfer of certain Dominion Lands to the Crown in the right of the Province of Manitoba.

P.C. 1298, 26th May, 1918, ordering that certain parcels of swamp lands, which were re-transferred to the Dominion of Canada under the provisions of Subsection 2 of Section 5, of the Manitoba Boundaries Extensions Act, be released to His Majesty King George the Fifth for the purposes of the Province of Manitoba.

P.C. 1230, 20th May, 1918, amending regulations for the disposal of petroleum and natural gas rights approved by Order in Council of the 19th of January, 1914.

P.C. 1263, 3rd June, 1918, enacted certain regulations in order to remove doubts which have arisen as to the validity of previous regulations.

P.C. 1101, 3rd June, 1918, ordering the rescinding of Section 27 of the regulations, established by Order in Council of 1st July, 1898, and substituting others therefor.

P.C. 1443, 12th June, 1918, authorizing a free grant of Dominion Lands to Alexander Kennedy by virtue of his occupation of the land at the date of the extinguishment of the Indian title.

P.C. 1480, 17th June, 1918, authorizing the Minister of the Interior to execute an agreement on behalf of His Majesty the King with the Canada Land and Irrigation Company, Limited, in substitution for a previous agreement made on the 31st September, 1914.

Not printed.

95. Return of Orders in Council which have been published in the *Canada Gazette*, between 16th March, 1918, and the 20th January, 1919, in accordance with the provisions of Section 77 of "The Dominion Lands Act," Chapter 20, 7-8 Edward VII, as follows:—

P.C. 60, 16th March, 1918, ordering that no royalty shall be levied or collected by the Crown on coal mined in the Yukon Territory for a period of five years from the 7th day of April, 1918.

P.C. 655, 16th March, 1918, ordering Order in Council of December 18, 1897, cancelled, and dividing the Northwest Territory into three provisional districts, Mackenzie, Keewatin and Franklin, according to the description and map annexed.

P.C. 651, 16th March, 1918, making regulations withdrawing pre-emption entry on Dominion Lands as provided by Section 27 of the Dominion Lands Act, Chapter 20, of 1908, and withdrawing the privilege of purchased homestead entry provided by Section 28 of the said Act, except in the case of land reserved for pre-emption entry for a homesteader on active service, and where notice has been issued to a person allowing him a specified time for securing his pre-emption.

P.C. 662, 16th March, 1918, ordering that certain lands be sold to General Turner at the rate of $1 per acre.

P.C. 705, 22nd March, 1918, providing that the area included within a certain right of way be transferred back to the Department of the Interior by the Department of Militia and Defence for sale to the Canadian Pacific Railway Company under certain conditions.

P.C. 751, 27th March, 1918, providing that further residence requirements be dispensed with in the case of Mr. Earle, a veteran of the South African War.

P.C. 813, 4th April, 1918, authorizing the Minister of the Interior to transfer certain lands from His Majesty King George the Fifth as represented by the Minister of the Interior to His Majesty as represented by the Minister of Public Works for the Province of Alberta.

P.C. 843, 5th April, 1918, providing that residence requirements under the Dominion Lands Act be dispensed with in the case of Harry H. Holmes, who had a considerable part of both his feet amputated.

P.C. 47-768, 5th April, 1918, providing that residence requirements of the Dominion Lands Act be dispensed with in the case of Ole Halsten owing to the physical infirmity of the entrant.

P.C. 48-768, 5th April, 1918, setting apart certain land for cemetery purposes in the Province of Saskatchewan.

P.C. 49-768, 5th April, 1918, dispensing with residence requirements of the Dominion Lands Act in the case of Mr. O. E. Senay, who is physically unfit to continue the performance of his residence duties.

P.C. 62-865, 10th April, 1918, authorizing a free grant to Mr. Robert Jones by virtue of his occupation of the land at the date of the extinguishment of the Indian title.

P.C. 61-865, 10th April, 1918, setting apart certain Dominion Lands for church and cemetery purposes in the Province of Saskatchewan; authorizing a grant to "La Corporation Episcopale Catholique Romaine de Regina."

P.C. 63-865, 10th April, 1918, authorizing a free grant of Dominion Lands to Mr. Benjamin Charles by virtue of his occupation of the said land at the date of the extinguishment of the Indian title.

P.C. 844, 10th April, 1918, authorizing the issue of patent to Mr. J. E. Ingram of certain Dominion Lands in exchange for other land owned by Mr. Ingram.

P.C. 842, 10th April, 1918, authorizing the Minister to have auction sales of School Lands held at certain points. Presented by Hon. Mr. Meighen, March 4, 1919.

Not printed.

CONTENTS OF VOLUME 10—*Continued.*

96. Return of Orders in Council which have been published in the *Canada Gazette,* between the 16th March, 1918, and the 20th January, 1919, in accordance with the provisions of Chapter 47, 2 George V, entitled "The Railway Belt Water Act," as follows:—

P.C. 1296, 6th June, 1918,—Making regulations called Water-lands regulations, effective for disposing of and administering Dominion Lands within the Railway Belt required for the development of water-power, etc.

P.C. 1464, 17th June, 1918,—Recommending certain lands situated in the Railway Belt near Ashcroft be sold to William Henry Hammond on certain conditions. Presented by Hon. Mr. Meighen, March 4, 1919.. .. ..*Not printed.*

97. Return of Orders in Council which have been published in the *Canada Gazette* and in the British Columbia *Gazette*, between 16th March, 1918, and the 20th January, 1919, in accordance with provisions of Subsection (*d*) of Section 38 of the regulations for the survey, administration, disposal and management of Dominion Lands within the 40-mile Railway Belt in the Province of British Columbia, as follows:—

P.C. 896, 12th April, 1918, ordering that the regulations be amended to provide for the leasing of unpatended Dominion Lands within the said Belt (a) where the entrant is on active service, etc.; (b) engaged in some work of national importance, and (c) deceased or insane.

P.C. 908, 22nd April, 1918, amending the regulations to provide that holders of homestead entries, employed as farm labourers, may be allowed the period of such employment as part of period of residence, subject to certain conditions.

P.C. 1509, 22nd June, 1918, amending the regulations by rescinding Section 9, and substituting a new section therefor, defining "highways" and authorizing the Province of British Columbia to construct certain roads, etc.

P.C. 1805, 19th July, 1918, making regulations for the granting of free entries on Dominion Lands in the Railway Belt to settlers under the authority of the Soldiers Settlement Act, 1917.

P.C. 1913, 5th August, 1918, amending Clause 41 of the regulations governing the granting of licenses and permits to cut timber to provide certain conditions for the holders of portable saw mill berths.

P.C. 1997, 14th August, 1918, providing that the title to certain lands described there be vested in His Majesty King George the Fifth for the purposes of the Province of British Columbia.

P.C. 2156, 6th September, 1918, providing that certain lands be vested in His Majesty King George the Fifth for the purposes of the Province of British Columbia.

P.C. 2157, 6th September, 1918, providing that certain lands be vested in His Majesty King George the Fifth for the purposes of the Province of British Columbia.

P.C. 2544, 17th October, 1918, withdrawing certain lands from the operations of the Order in Council of the 17th September, 1889, P.C. 2169. Presented by Hon. Mr Meighen, March 4, 1919.. .. ..*Not Printed.*

98. Orders in Council passed under the provisions of Chapter 18, 7-8 George V,—"The Migratory Birds Convention Act." Presented by Hon. Mr. Meighen, March 4, 1919. *Not printed.*

99. Orders in Council which have been published in the *Canada Gazette,* between the 16th March, 1918, and the 20th January, 1919, in accordance with the provisions of Section 19, of Chapter 10, 1-2 George V,—"The Forest Reserves and Parks Act," as follows:—

P.C. 739, 26th March, 1918, authorizing the Minister to accept the surrender of certain lands from the Canadian Pacific Railway.

P.C. 675, 26th March, 1918, amending regulations for Dominion Forest Reserves established by Orders in Council of 8th August, 1913, 24th September, 1913, and 20th April, 1916.

P.C. 1188, 17th March, 1918, rescinding Order in Council of October 31, 1916, and granting certain land to the Canadian Pacific Railway, subject to certain conditions.

P.C. 1821, 25th July, 1918, granting authority to the Minister to issue domestic fishing permits for certain regulations during the years 1918, 1919, and 1920.

P.C. 2817, 15th November, 1918, granting the corporation of the Town of Wainwright, Alberta, a renewal of the rights granted by Order in Council of the 20th March, 1914, for a period of two years from the 1st of May, 1918. Presented by Hon. Mr. Meighen, March 4, 1919... .. ..*Not printed.*

100. Copies of Orders in Council which have been published in the *Canada Gazette* between the 5th April, 1918, and the 20th February, 1919, in accordance with provisions of Section 8, Subsection 2 of Chapter 21, 7-8 George V, "The Soldiers Settlement Act." Presented by Hon. Mr. Meighen, March 4, 1919.. .. ..*Not printed.*

100*a*. Copy of Order in Council, P.C. 925, dated 3rd May, 1919: Issue of "Attestation" papers to soldier applicants for lands under the Regulations of the Soldier Settlement Board. Presented by Hon. Mr. Calder, May 27, 1919.. .. ..*Not printed.*

CONTENTS OF VOLUME 10—*Continued.*

101. First Annual Report with Appendices, of The Historical Documents Publication Board. Presented by Hon. Mr. Rowell, March 4, 1919.. .. ..*Not printed.*

102. Final Report of the International Joint Commission, on the Pollution of Boundary Waters Reference. Presented by Hon. Mr. Rowell, March 4, 1919.. .. ..*Not printed.*

103. Copies of Orders in Council affecting the increases and allowances of the Civil Service of Canada. Presented by Hon. Mr. Maclean, March 4, 1919.. .. ..*Not printed.*

104. Report of the Royal Commission appointed to inquire into and report upon conditions in the Pilotage Districts of Miramichi, Sydney, Louisburg, Halifax, St. John, Montreal and Quebec, and to recommend, if necessary, any change found desirable. Presented by Hon. Mr. Maclean, March 4, 1919.
Printed for distribution to Senators and Members, and sessional papers.

105. Report of the Royal Commission appointed to inquire into and report upon the conditions in the Pilotage Districts of Vancouver, Victoria, Nanaimo and New Westminister, and to recommend, if necessary, any change found desirable therein. Presented by Hon. Mr. Maclean, March 4, 1919.
Printed for distribution to Senators and Members, and sessional papers.

106. Memorandum from the Canadian Trade Commission giving a list of the British Import Restrictions. Presented by Hon. Mr. Maclean, March 4, 1919.. .. .. ..*Not printed.*

107. Certified copy of agreement between the St. Martin's Railway Company and His Majesty the King. Presented by Hon. Mr. Reid, March 4, 1919. .. ..*Not printed.*

108. Certified copy of agreement between the York and Carleton Railway Company and His Majesty the King. Presented by Hon. Mr. Reid, March 4, 1919.. .. .. ..*Not printed.*

109. Copies of Orders in Council affecting the Civil Service Commission. Presented by Hon. Mr. Burrell, March 4, 1919.. .. ..*Not printed.*

109*a*. Regulations of the Civil Service Commission, approved by His Excellency the Governor General in Council on the 21st December, 1918. Presented by Hon. Mr. Burrell, April 7, 1919.. .. ..*Not printed.*

110. Correspondence relating to the resignation of Mr. F. B. McCurdy, M.P., as Parliamentary Secretary of the Department of Soldiers Civil Re-establishment and Chairman of the Invalided Soldiers' Commission. Presented by Sir Thomas White, March 4, 1919.
Not printed.

111. Copies of Orders in Council affecting the Department of the Secretary of State. Presented by Hon. Mr. Burrell, March 4, 1919.. .. ..*Not printed.*

112. Copies of Orders in Council affecting the Department of Mines. Presented by Hon. Mr. Burrell, March, 1919.. .. ..*Not printed.*

113. Copies of Orders in Council affecting the Public Archives. Presented by Hon. Mr. Burrell, March 4, 1919.. .. ..*Not printed*

114. Return called for by Section 88, of Chapter 62, Revised Statutes of Canada, requiring that the Minister of the Interior shall lay before Parliament, each year, a return of liquor brought from any place out of Canada into the Territories by special permission in writing of the Commission of the Northwest Territories, for the year ending 31st December, 1917. Presented by Hon. Mr. Meighen, March 6, 1919.. .. .. ..*Not printed.*

115. Return showing all lands sold by the Canadian Pacific Railway Company during the year ending 30th September, 1917, together with the names of the purchasers, in accordance with the Statutes of Canada, 1886, Chapter 9, Section 8. Presented by Hon. Mr. Meighen, March 6, 1919.. .. ..*Not printed.*

116. Copy of correspondence between the Secretary of State for the Colonies and His Excellency the Governor General, relating to the gift of two submarines to the Canadian Government. Presented by Hon. Mr. Rowell, March 6, 1919.. .. .. ..*Not printed.*

117. Report of a Committee of Experts, appointed by Order in Council dated 20th November, 1918, on the recommendation of the Civil Service Commission, to investigate and report conditions in the Department of Public Printing and Stationery. Presented by Hon. Mr. Burrell, March 6, 1919.
Printed for distribution to Senators and Members of Parliament.

118. Report of the work of the Department of Soldiers' Civil Re-establishment (Invalided Soldiers' Commission), to March 31, 1918, with Appendices to June 22, 1918. Presented by Mr. Clarke (Bruce) March 7, 1919.. .. ..*Not printed.*

CONTENTS OF VOLUME 10—*Continued.*

119. Copies of Orders in Council affecting the Department of Agriculture. Presented by Hon. Mr. Crerar, March 7, 1919.. .. ..*Not printed.*

120. Order in Council P.C. 517, dated 7th March, 1919, appointing the Minister of Railways and Canals receiver of the Grand Trunk Pacific Railway System. Presented by Sir Thomas White, March 10, 1919.. .. ..*Not printed.*

120*a*. Copies of Papers concerning the Receivership of the Grand Trunk Pacific Railway System, as follows:—

(*a*) Copies of the important correspondence passing between Grand Trunk officials and members of the Government in connection with the negotiations that were carried on;

(*b*) Copies of communications between the Receiver and officials of the Grand Trunk Pacific;

(*c*) Copies of certain communications that have passed between Grand Trunk officials and the Government since the passing of the Order in Council;

(*d*) Copies of the Order and an amending Order dated March 13, 1919;

(*e*) Balance sheets of the Grand Trunk Pacific Railway Company, and of its subsidiary companies, and statements of revenue and expenditure of the system. Presented by Sir Thomas White, March 31, 1919 .. ..*Not printed.*

121. Orders in Council respecting pay and allowances to ex-soldiers receiving treatment and training under the Soldiers' Civil Re-establishment. Presented by Mr. Clark, (Bruce), March 10, 1919.. .. ..*Not printed.*

122. Orders in Council respecting Pensions. Presented by Mr. Clark (Bruce), March 10, 1919. .. ..*Not printed.*

123. Ninth Annual Report of the Commission of Conservation for the year 1917. Presented by Hon. Mr. Rowell March 10, 1919.. .. ..*Not printed.*

124. Orders in Council affecting the Department of Customs. Presented by Hon. Mr. Reid, March 12, 1919.. .. ..*Not printed.*

125. Certified copy of an Agreement between the Elgin and Havelock Railway Company and His Majesty the King. Presented by Hon. Mr. Reid, March 14, 1919.. ..*Not printed.*

126. Copies of a General Rule and Order amending a Rule of the Exchequer Court of Canada, pursuant to Section 88 of the Exchequer Court Act (R.S.C. 1906, Chap. 140). Presented by Hon. Mr. Burrell, March 18, 1919.. .. ..*Not printed.*

127. Return showing statements of Remissions and Refunds in Tolls and Duties, recorded in the Department of Secretary of State of Canada, year ending March 31, 1918. (Senate). *Not printed.*

128. Return to an Order of the House of the 18th April, 1918, for a Return showing:—

1. If the Minister of Finance has issued certificates permitting the offer and sale of debentures in pursuance of the Order in Council, dated 22nd December, 1917, in relation thereto.

2. If so, how many permits were granted or certificates issued.

3. To what provincial governments, municipal corporations, school boards or other legally constituted bodies permits were granted or certificates issued.

4. For what amount permits were granted and certificates issued, in each case. Presented, March 19, 1919.— *Mr. Trahan.* .. ..*Not printed.*

128*a*. Return to an Order of the House of the 2nd May, 1918, for a Return showing:—

What municipalities have been authorized by the Minister of Finance to issue debentures on the market, since the Order in Council enacted in this respect. Presented March 19, 1919.—*Mr. Seguin*.. .. ..*Not printed.*

128*b*. Return showing:—1. If the Minister of Finance has refused to issue certificates permitting the offer and sale of debentures, in pursuance of the Order in Council, dated 22nd December, 1917, in relation thereto. 2. If so, how many permits or certificates have been refused. 3. What provincial governments, municipal corporations, school boards, or other legally constituted bodies have been refused said permits or certificates, and what reasons, in each case, were given. 4. For what amount, in each case, authority was asked for. Presented March 19, 1919.—*Mr. Traham*.. ..*Not printed.*

129. Return showing:—Referring to the item "Composition, Stereotype, Mats, shipping charges, etc., $20,360.34," contained in the return of amounts paid for Victory Loan advertising,—1. To whom the said sum of $20,360.34 was paid. 2. Whether the said sum or any portion thereof was paid under contract. 3. If so, with whom the contract was made, and what the particulars are thereof. Presented March 19, 1919.—*Mr. Murphy*.. .. ..*Not printed.*

CONTENTS OF VOLUME 10—*Continued.*

130. Return to an Address to His Excellency the Governor General of the 20th March, 1918, for a copy of any treaty between Great Britain and the United States, permitting the conscription of British Subjects in the United States for military service and of American citizens residing in British Dominions. Presented March 19, 1919.—*Sir Wilfrid Laurier* . . . . . *Not printed.*

131. Return to an Order of the Senate, dated the 21st March, 1918, showing, province by province, up to the 15th March, instant, in as many distinct columns:—1. The number of men of the first class liable to be called to military service at the date fixed by the Government's proclamation. 2. The number of those who have responded to this call, distinguishing: (*a*) Those who entered the service immediately. (*b*) Those who have applied for exemption from the service for one of the reasons stated in the Military Service Act. 3. Out of the number of the men conscripted, thus applying for exemption. (*a*) The number of those who have obtained complete exemption. (*b*) The number of those who have obtained temporary exemption. (*c*) The number of those whose applications were disallowed. (*d*) The number of those whose applications have not been taken into consideration (1) By the local exemption tribunals; (2) By the appeal tribunals. 4. The number of volunteers and conscripts actually in the service since the Military Service Act has been in force distinguishing: (*a*) Those who enlisted voluntarily. (*b*) Those who accepted conscription. (*c*) Those who were conscripted by the judgments of the tribunals. 5. The number of men belonging to the first class who never responded to the call.—(*The Senate*) . . . . . *Not printed.*

132. Return to an Order of the Senate, dated the 14th May, 1918, showing the number of exemptions asked for in each province, and also the number of appeals in each province from the decisions of the Judges by the Military authorities to the Central Appeal Judge.—(*The Senate*) . . . . . *Not printed.*

133. Return to an Order of the Senate, dated the 20th May, 1918, showing copies of all papers, letters, telegrams and communications or other documents in its possession in connection with the appointment or proposed appointment of one E. G. Bill, to a position in the Statistical Division of the Military Service Branch, Justice Department, under Colonel Machin, and any correspondence or statement of efforts made to ascertain if any returned soldiers of university training qualified to fill the aforesaid position if such officer be necessary.—(*The Senate*) . . . . . *Not printed.*

134. Report of the Proceedings of the Commissioners of Internal Economy of the House of Commons for the year 1917. Presented by Hon. Mr. Speaker, March 19, 1919. *Not printed.*

135. Return to an Order of the House of the 13th May, 1918, for a copy of all documents or correspondence between the Hon. Albert Sévigny and the Director General of Government Railways or the Superintendent of said railways; also copy of the reports or inquiries held in connection with J. W. Boivin, Transcontinental Agent at St. Malachie, Dorchester County. Presented March 20, 1919.—*Mr. Cannon* . . . . *Not printed.*

136. Return to an Order of the House of the 22nd April, 1918, for a Return giving an abstract of all claims, with the names of the claimants and the amount of each claim, made against the Department of Railways and Canals for breakage and pilferage on the Prince Edward Island Railway in 1917. Presented March 20, 1919.—*Mr. Sinclair (P.E.I.)* . . . . . *Not printed.*

137. Return to an Order of the House of the 22nd April, 1918, for a Return giving an abstract of all claims, with the names of the claimants and the amounts of each claim filed against the Department of Railways and Canals, on account of the freezing of shipments of potatoes on the Prince Edward Island Railway or on the docks at Charlottetown, Pictou, Summerside and Pointe du Chêne, during the year 1916. Also a return giving the same information for the year 1917, including the above-named railway and docks, the New Brunswick and Prince Edward Island Railway and the dock at Port Borden. Presented March 20, 1919.—*Mr. Sinclair, (P.E.I.)* . . . . . *Not printed.*

138. Partial Return to an Order of the House of the 25th March, 1918, for a return showing all the Commissions created since September, 1911, the names of the Chairman or Presidents and Members of the said Commissions, with the amounts expended in connection therewith including rents, furnishing, equipment, heat, light, salaries, travelling expenses, stationery, printing, advertising, telegrams, telephones, postage and all other expenses, as well as the reports made by the said Commissions. Presented March 20, 1919.—*Mr. Casgrain* . . . . . *Not printed.*

138*a*. The number and name of all Commissions appointed by Order in Council since the General Elections of 1911, giving date of each Order in Council, names of Commissioners, terms of service, amount paid to each of them, and total cost of each Commission.—(*The Senate*) . . . . . *Not printed.*

CONTENTS OF VOLUME 10—*Continued.*

138*b*. Supplementary Return to an Order of the House of the 25th March, 1918, for a return showing all the Commissions created since September, 1911, the names of the Chairman or Presidents and Members of the said Commissions, with the amounts expended in connection therewith, including rents, furnishing, equipment, heat, light, salaries, travelling expenses, stationery, printing, advertising, telegrams, telephones, postage and all other expenses as well as the reports made by the said Commissions. Presented June 26, 1919.—*Mr. Casgrain*.. .. ..*Not printed.*

139. Return to an Order of the House of the 29th April, 1918, for a copy of all correspondence between the City of Quebec, the Quebec Board of Trade and the Government with regard to the claims of the City of Quebec for terminals of the National Transcontinental Railway and other matters. Presented March 20, 1019.—*Mr. Lavigueur.* *Not printed.*

140. Return to an Order of the House of the 24th April, 1918, for a copy of all documents correspondence, papers, court proceedings and reports by the Honourable Justice Duff in reference to the investigation made by Judge Duff in the matter of Jules Gobeil, of Baie St. Paul, against Magistrate A. Simard, of the said place. Presented March 20, 1919.—*Mr. Casgrain* .. ..*Not printed.*

141. Return to an Order of the House of the 20th May, 1918, for a copy of all letters, telegrams and correspondence generally exchanged between the Government and Mr. Justice Duff, Central Appeal Judge, during the last election campaign concerning the application and the administration of the Military Service Act in conjunction with the Order in Council passed on December 3, 1917. Presented March 20, 1919.—*Mr. Brouillard*.. .. ..*Not printed.*

142. Return to an Order of the House of the 2nd May, 1918, for a Return showing:—1. How many military officers have been employed in the enforcement of the Military Service Act up to March 31, 1918, in each province. 2. How many civilians in each province. Presented March 20, 1919.—*Mr. Devlin*.. .. ..*Not printed.*

143. Return to an Order of the House of the 13th May, 1918, for a copy of all correspondence between the Registrar, E. Hart Nichols, under the Military Service Act, Halifax. N.S., and the Military Service Council or any member thereof, during the years 1917 and 1918, concerning non-compliance with the Military Service Act in Lunenburg County, N.S.; also for copy of all correspondence between the Military Service Council, or any member thereof, or the Minister of Justice, or the Deputy Minister of Justice and Mr. William Duff, M.P., Lunenburg, N.S., during the years 1917 and 1918; also a copy of any statements, affidavits and declarations now on file in the Military Service Council in respect of the administration of the Military Service Act in the County of Lunenburg and more particularly in respect of any alleged interference by Mr. William Duff with the proper enforcement of the said Act. Presented March 20, 1919.—*Mr. Currie*.. .. ..*Not printed*

144. Return to an Order of the House of the 20th May, 1918, for a Return showing:—1. Whether private custom work is done at the Portsmouth Penitentiary by skilled convict workmen. If so, whether any allowance is made to said convicts for such work. 2. Whether walnut chairs were repaired and upholstered for P. Devlin, Immigration Officer at Kingston. If so, what the cost was to Mr. Devlin. 3. Whether several articles of furniture were made for and shipped to Mr. Dillon, Purchasing Agent for Penitentiaries. If so, what articles were shipped to Montreal and Ottawa for him, what their cost was, and by whom it was paid. 4. What articles were made or repaired and shipped to persons in Toronto. Renfrew, Ottawa, Kingston and New York, by whose order, to whom sent, and the amount paid in each case. 5. What articles have been repaired or made for the Rev. McDonald and for the Roman Catholic Church at Portsmouth, what amount was paid for such work, by whom paid and when. 6. What articles of furniture have been made and repaired during the past two years (*a*) for officials of the penitentiary, (*b*) for persons other than officials, with the name and cost in each case. 7. Whether some statistics were copied by one of the convicts for the United States authorities. If so, how much was paid by the United States for said work, and what amount was placed to the credit of the convict who did the work. 8. Whether convicts have been ordered to make articles patented in the United States, the sole right for the manufacture of which had been sold to a firm in Canada, and whether convicts were ordered to make working drawings of the same for future use. Presented March 20, 1919.—*Mr. Edwards*.. .. ..*Not printed.*

145. Return to an Order of the House of the 15th May, 1918, for a Return showing:—1. The amount expended by the Government on Toronto Harbour since Confederation. 2. The initial cost of such protection as has been placed on the south shore of the Island; also cost of repairs to same. 3. To what extent the Island has been reduced since Confederation due to erosion. 4. What part or parts of the harbour front are controlled by the Dominion Government. Presented March 20, 1919.—*Mr. Foster, (York).* *Not printed.*

CONTENTS OF VOLUME 10—*Continued.*

146. Return to an Order of the House of the 20th May, 1918, for a copy of all accounts, vouchers, receipts, telegrams, particulars and correspondence of all kinds in any way referring to the expenditure of money by this Government at Friar Siding, under the foremanship of P. Doucette, during the months of October, November and December, 1917. Presented March 20, 1919.—*Mr. Chisholm*.. .. ..*Not printed.*

147. Return to an Order of the House of the 20th May, 1918, for a copy of all letters, telegrams, vouchers, accounts and all documents in any way referring to the expenditure of money in repairs on the Margaree Breakwater, by the Department of Public Works, during the years 1916-17 and 1917-18. Presented March 20, 1919.—*Mr. Chisholm. Not printed.*

148. Return to an Address to His Excellency the Governor General of the 18th April, 1918, for a copy of the correspondence concerning the resignation of Commissioner Perry, C.M.G., as head of Royal Northwest Mounted Police. Presented March 20, 1919.—*Mr. Lemieux*.. .. ..*Not printed.*

149. Return to an Order of the House of the 21st March, 1918, for a copy of all letters, telegrams and other papers concerning the steamer service between Montreal, Quebec and the various harbours of Gaspé. Presented March 20, 1919.—*Mr. Lemieux. Not printed.*

150. Return to an Order of the House of the 24th April, 1918, for a copy of all correspondence and documents exchanged between the Minister of Justice and his Department and their representatives in Montreal in connection with obtaining the release on bail, and arranging bail and security for one Charles, alias Ti-Noir Desjardins. Also a copy of all correspondence with the Minister of Justice and his Department and their representatives in Montreal and elsewhere, and all other documents in connection with obtaining the release of and giving bail and security on behalf of the same man recently in Montreal. Presented March 21, 1919.—*Mr. Casgrain* .. .. ..*Not printed.*

151. A detailed statement of all bonds or securities registered in the Department of the Secretary of State of Canada, since last return (2nd April, 1918) submitted to the Parliament of Canada under Section 32 of Chapter 19, of the Revised Statutes of Canada, 1906. Presented by Hon. Mr. Burrell, March 25, 1919.. .. .. ..*Not printed.*

152. Return to an Address to His Excellency the Governor General of the 29th April, 1918, for a copy of all Orders in Council and instructions given by the Minister in charge in connection with the work of Mr. M. E. Nicholls, Director of Public Information for Canada; along with a copy of all telegrams, letters, statements and articles sent out by Mr. Nicholls since assuming the position of Director of Public Information; and also copy of the mailing list of the individuals or companies to whom this information was sent. Presented March 26, 1919.—*Mr. Casgrain*.. .. ..*Not printed.*

153. Return showing:—1. The amount spent by the Government for each of the canals of Canada since Confederation. 2. The cost of the upkeep of each of these canals, and what receipts have been received from each of them. Presented March 26, 1919. *Mr. Casgrain*.. .. ..*Not printed.*

154. Report of the Military Service Council on the administration of the Military Service Act, 1917, with Supplementary Report showing the progress which has been made in obtaining recruits under the Military Service Act, to April 15, 1918. Presented by Hon. Mr. Meighen, March 27, 1919.. .. ..*Not printed.*

155. Return to an Order of the House of the 19th March, 1919, for a copy of all correspondence between the Customs Department and the Customs House authorities at the port of Sutton-Aberdeen touching the dismissal of William Lassonde. Presented March 28, 1919.—*Mr. McMaster*.. .. ..*Not printed.*

156. Return to an Order of the House of the 19th March, 1919, for a return showing the names of all persons employed up to March 1, 1919, in connection with the work of the Repatriation Committee, giving the class of work each person is doing, their salary or wages, the living or other expenses paid, and the former occupation of each person, along with a statement showing what other work, if any, said persons are employed in. Presented March 28, 1919.—*Mr. Proulx*.. .. ..*Not printed.*

157. Return to an Order of the House of the 19th March, 1919, for a copy of all papers and correspondence regarding the Commission granted to Canadian officers during the present war. Presented March 31, 1919.—*Mr. Casgrain*.. .. ..*Not printed.*

158. Return to an Order of the House of the 24th March, 1919, for a Return showing:—1. The names of the one hundred and thirty-three persons who were prosecuted during the years 1913, 1914, 1915, 1916, 1917, 1918 and 1919, for having been found in possession of, or for selling, adulterated maple sugar. 2. The amounts of the fines in each case. Presented March 31, 1919.—*Mr. Boyer*.. .. ..*Not printed.*

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159. Return to an Order of the House of the 24th March, 1919, for a Return showing:—1. The names of the one hundred and twenty-seven persons who were prosecuted during the years 1913, 1914, 1915, 1916, 1917, 1918 and 1919, for having been found in possession of, or for selling, adulterated maple syrup. 2. The amounts of the fines in each case. Presented March 31, 1919.—*Mr. Boyer*.. .. ..*Not printed.*

160. Return to an Order of the House of the 24th March, 1919, for a Return showing:—1. The total expenses in connection with the Victory Loan campaign of 1918 in Prince Edward County, Ontario. 2. Number of clerks employed in connection with the said campaign in the said county. 3. Amount paid to each, and of such amount, how much was for salary and how much for travelling expenses. Presented March 31, 1919.—*Mr. Proulx*.. .. ..*Not printed.*

161. Return to an Order of the House of the 24th March, 1919, for a Return showing:—1. The total amount paid by the Canadian Government for the rental of offices and other space, in the Cities of Montreal, Ottawa and Quebec, as well as in all the different provinces of the Dominion, to put in force the Military Service Act. 2. The names of the proprietors or landlords from whom the said offices or places were leased. 3. The names of the lawyers who attended to and helped The Honourable Mr. Justice Duff, in Ottawa, in the disposal of the appeals made under the Military Service Act, last year, and how much they were paid. Presented March 31, 1919.—*Mr. Casgrain.* *Not printed.*

162. Return to an Order of the House of the 25th March, 1918, for a Return showing:—1. Who the contractors are for the transportation of His Majesty's Mails in the County of Dorchester. 2. What sums they receive annually for this work. 3. When the contracts in each case were given, and upon whose recommendation. 4. When each of these contracts terminates. Presented March 31, 1919.—*Mr. Cannon* ..*Not printed.*

163. Return to an Order of the House of the 13th May, 1918, for a copy of the contract made between the Government of Canada and Mr. Mosher, of Feltzen South, in the County of Lunenburg, for the carrying of His Majesty's mails between Feltzen South and Rose Bay, in the County of Lunenburg. Said contract being executed during the month of September, October or November, 1917, and having as one of the bondsmen on the said contract Mr. Wm. Duff, of Lunenburg, in the County of Lunenburg. Presented March 31, 1919.—*Mr. Currie*.. .. ..*Not printed.*

164. Return to an Order of the House of the 19th March, 1919, for a Return showing:—1. The number of times the Military Service Act, 1917, was amended by Order in Council. 2. The dates and the numbers of the said Orders in Council. Presented March 31, 1919.—*Mr. Tobin*.. .. ..*Not printed.*

165. Return to an Order of the House of the 20th March, 1919, for a Return showing:—1. The number of men of military age who have been condemned to terms of imprisonment for infractions of the Military Service Act, 1917, in each of the nine province of Canada. 2. The number of the said men who have been released from prison before the expiration of their terms. 3. Their names, where they were imprisoned and the length of their respective sentences. Presented March 31, 1919.—*Mr. Fontaine.* *Not printed.*

166. Average number of men employed on the Dominion Police Force during each month of the year 1918, and of their pay and travelling expenses, pursuant to Chapter 92, Section 6, Subsection 2, of the Revised Statutes of Canada. Presented by Hon. Mr. Meighen, April 1, 1919.. .. ..*Not printed.*

167. Return to an Order of the House of the 19th March, 1919, for a Return showing:—1. The amount of the public debt of Canada on the 21st September, 1911. 2. New loans made by the Dominion of Canada since said date, indicating for each of said loans; (*a*) the date; (*b*) the amount; (*c*) the rate of interest; (*d*) the name of the place where such loan was floated; (*e*) the date of purchase; (*f*) the object for which said additional loans were made. 3. The amount of the public debt on the 10th March, 1919. 4. The result obtained through the last National Loan in Canada, indicating the amount subscribed in each Province. 5. Of the amount raised through the last National Loan, what sums were expended (*a*) for war purposes; (*b*) for other purposes. 6. How much the floating of our last National Loan cost, giving the figures in detail. Presented April 1, 1919.—*Mr. Vien*.. .. ..*Not printed.*

168. Return to an Order of the House of the 19th March, 1919, for a Return showing:—1. The cost to the Government for advertising and printing in connection with the Victory Loan of 1917, giving amounts for advertising and printing separately. 2. The cost to the Government for advertising and printing in connection with the Victory Loan of 1918, giving amounts for advertising and printing separately. 3. Amount paid in commissions in connection with said loans for 1917 and 1918. 4. The total cost in connection with the campaign for the said Victory Loans of 1917 and 1918. Presented April 1, 1919.—*Mr. Duff*.. .. ..*Not printed.*

CONTENTS OF VOLUME 10—*Continued.*

169. Return to an Order of the House of the 19th March, 1919, for a Return showing:—1. How many appointments have been made to the Civil Service by the Civil Service Commission since the passing of the Civil Service Act of 1918. 2. How many of these appointments were given to returned soldiers who had served overseas in the actual theatre of war. 3. How many were given to those who had not served in the actual theatre of war. 4. What was the aggregate, also the average salaries pertaining to both classes referred to in questions two and three. Presented April 1, 1919.—*Mr. Sutherland*.. .. ..*Not printed.*

170. Return to an Order of the Senate, dated the 20th March, 1919, showing the cost of enforcing of the National Service Act, of the Military Service Act, and of the Order in Council establishing the Canada Registration Board.—(*The Senate.*) April 2, 1919.. .. ..*Not printed.*

171. Return to an Order of the House of the 26th March, 1919, for a Return showing:—1. Who the Director of Vocational Training is. His salary. His profession. What special training he has had to fit him as "Director of Vocational Training." 2. How many units for Vocational Training there are in Canada. How many officers in each unit, and at what salary. Their profession or training. 3. The cost of administration, (*a*) at Ottawa; (*b*) at each unit. The cost for maintenance. Total cost per year. Estimated cost for coming fiscal year. 4. Number of applications for training received. Number from boys under age. Number refused training because they have been under age. 5. Whether Vocational Training Branch gives an agricultural course. Whether Land Settlement Board gives an agricultural course. Presented April 3. 1919.—*Mr. Stevens*.. .. ..*Not printed.*

172. Return to an Order of the House of the 19th March, 1919, for a copy of all letters, telegrams and other documents exchanged between any Department of the Government and any person or persons, relative to charges of sedition made against Bishop Budka, of Winnipeg. Presented April 3, 1919.—*Mr. Blake*.. .. ..*Not printed.*

173. Return to an Address of the Senate, dated the 21st of March, 1918 containing statements showing in detail the expenditure made in connection with the last elections, the conscription law, and the National Service, up to the 1st of March, and that the said Address be presented to His Excellency the Governor General by such members of this House as are members of the Privy Council.—(*The Senate.*) April 3, 1919. *Not printed.*

174. Return to an Order of the House of the 31st March, 1919, for a Return showing:—1. The names of the canvassers for the Victory Loan of 1918 in South East Grey, and amount paid each as commission. 2. Amounts paid to Toronto brokerage firms for commissions in connection with the said Victory Loan, and the names of such firms. Presented April 4, 1919.—*Mr. Proulx*.. .. ..*Not printed.*

174a. Return to an Order of the House of the 10th April, 1919, for a Return showing:—1. To what firms or brokers, in the Province of Quebec, brokerage was paid by the Government in connection with the last Victory Loan. 2. Amount paid to each. Presented April 23, 1919.—*Mr. Proulx*.. .. ..*Not printed.*

174b. Return to an Order of the House of the 31st March, 1919, for a Return showing:—1. Into how many districts the Dominion was divided for the purpose of the flotation of the Victory Loan. 2. The number of persons employed in each district, and their names. 3. The exact expenditure incurred by each district association. 4. Amount each organizing or canvasser received. 5. What brokers were employed throughout the Dominion. 6. The actual amount of bonds credited to each broker. 7. What remuneration each received. Presented April 30, 1919.—*Mr. Power*.. .. .. ..*Not printed.*

175. Return to an Order of the House of the 24th April, 1918, for a copy of all letters, petitions and communications received by the Acting Postmaster General or any official of his Department in reference to the closing of the Post Office at Le Blancville, in the County of Westmorland, New Brunswick. Presented April 4, 1919.—*Mr. Copp.* *Not printed.*

176. Return to an Order of the House of the 24th April, 1918, for a Return showing:—1. The names and addresses of the different deputy returning officers, enumerators, janitors and lessees of polls in the election of December 17, 1917, in the County of L'Assomption and Montcalm. 2. Amount paid to each of the above parties for his services in said election. 3. Whether all these accounts are paid. 4. If not, which yet are unpaid, and why they have not been settled. Presented April 4, 1919.—*Mr. Seguin.* *Not printed.*

177. Return to an Order of the House of the 15th April, 1918, for a Return showing:—1. What sums have been expended since the beginning of the war by the Government, on advertising, in connection with (*a*) Voluntary recruiting, (*b*) Government loans,

CONTENTS OF VOLUME 10—*Continued.*

(*c*) Production of foodstuffs, including advertisement in relation to the Food Controller's Office or Canada Food Board, (*d*) Military Service Act, and (*e*) Fuel Controller's Office. 2. What rates were paid, and whether they were the ordinary or usual commercial rates. 3. What papers received these advertisements, and what amount to each. He also laid before the House, by command of His Excellency the Governor General,—Tenth Annual Report of the Civil Service Commission of Canada, for the year ending August 31, 1918. Presented April 7, 1919.—*Mr. Pedlow.*
Not printed.

178. Return to an Order of the House of the 19th March, 1919, for a copy of the Marconi Wireless Company's contract with the Department of Naval Service, showing the date the contract was made and signed. Presented March 8, 1919.—*Mr. Tobin.*
Not printed.

178*a*. Supplementary Return to an Order of the House of the 19th March, 1919, for a copy of the Marconi Wireless Company's contract with the Department of Naval Service, showing the date the contract was made and signed. Presented April 15, 1919.—*Mr. Tobin*.. .. ..*Not printed.*

179. Return to an Order of the House of the 7th April, 1919, for a Return showing:—1. The present duties of the Censor's Department. 2. The men employed, and their salaries. 3. Whether any of them have other occupations. 4. How many of them are former newspaper men, and what their names are. 5. Whether any further need of a cable censor in Canada. 6. The Cost of the Censor's Office per year. Presented March 8, 1919.—*Mr. Pedlow* .. ..*Not printed.*

180. Return to an Order of the House of the 24th March, 1919, for a Return showing:—1. The total amount of the damages caused by accidents which have occurred on the Intercolonial Railway, between Moncton and Lévis, since the 1st November, 1918, to residents' and Government property, respectively. 2. Whether any lives were lost as a result of such accidents. If so, how many. Presented March 8, 1918.—*Mr. Bourassa.*
Not printed.

181. Report of the Canada Registration Board, 1918. Presented by Hon. Mr. Rowell, April 9, 1919.. .. ..*Not printed.*

182. Return to an Order of the House of the 2nd April, 1919, for a Return giving a detailed statement of the number of bank mergers in Canada since October 1, 1911, up to date, together with a copy of all petitions and correspondence opposing same. Also, the names of banks affected thereby. Presented April 9, 1919.—*Mr. Lemieux.*
Not printed.

183. Return to an Order of the House of the 27th March, 1919, for a Return showing:—1. Whether the Government increased the salaries of its civil servants in the County of Dorchester during the year 1917. 2. If so, the names of the officials and employees who received increases, giving the date of each increase. 3. On whose recommendation these increases were made. Presented April 9, 1919.—*Mr. Cannon*.. ..*Not printed.*

184. Copy of Order in Council, P.C. 784, dated 9th April, 1919, appointing a Royal Commission to investigate industrial relations and submit a report as to how they may be improved. Presented by Sir Thomas White, April 9, 1919.. .. ..*Not printed.*

184*a*. Copy of Order in Council, P.C. 670, dated 4th April, 1919,—Defining the scope of the Commission recently appointed to consider labour relations in Canada. Presented by Sir Thomas White, April 14, 1919.. .. ..*Not printed.*

184*b*. Report of Commission appointed under Order in Council (P.C. 670) to inquire into Industrial Relations in Canada, together with a Minority Report. Presented by Sir Robert Borden, July 1, 1919.. .. ..*Not printed.*

185. Memorandum No. 5, respecting work of the Department of Militia and Defence—European War—from January 1, 1918, to October 31, 1918. Presented by Hon. Mr. Mewburn, March 10, 1919.. .. ..*Not printed.*

186. Return to an Order of the House of the 7th April, 1919, for a Return showing:—1. The total amount of the domestic Dominion War Loans subscribed to date. 2. The amount thereof subscribed by each province of the Dominion. 3. The amount of deposits in the banks at the close of the fiscal year next prior to the date of the first of such loans. 4. The amount of deposits in Canadian Banks according to the last issued statement, and the date of such statement. Presented April 11, 1919.—*Mr. Middlebro.*
Not printed.

187. Copy of Order in Council P.C. 690, dated 2nd April, 1919, *re* agreement between the Dominion of Canada and the Kingdom of Roumania respecting a credit for twenty-five million dollars ($25,000,000). Presented by Sir Thomas White, April 11, 1919.
Not printed.

CONTENTS OF VOLUME 10—*Continued.*

188. Copy of Order in Council, P.C. 800, dated 10th April, 1919, requesting His Majesty to issue letters patent to each of the following named persons:—

The Right Honourable Sir Robert Borden, a Member of His Majesty's Most Honourable Privy Council, G.C.M.G., K.C., M.P., Prime Minister of the Dominion of Canada;

The Right Honourable Sir George Eulas Foster, a Member of His Majesty's Most Honourable Privy Council, G.C.M.G., M.P., Minister of Trade and Commerce of the Dominion of Canada;

The Honourable Arthur Lewis Sifton, K.C., M.P., Minister of Customs and Inland Revenue of the Dominion of Canada;

The Honourable Charles Joseph Doherty, K.C., M.P., Minister of Justice of the Dominion of Canada; naming him and appointing him as Commissioner and Plenipotentiary in respect of the Dominion of Canada, with full power to sign any treaties concluded at the Peace Conference. Presented by Hon. Mr. Rowell, April 11, 1919. *Not printed.*

189. Return to an Order of the House of the 9th March, 1919, for a Return showing:—1. If a man named Cooke was employed by the Immigration Branch of the Interior Department, or by the Minister of Immigration and Colonization, during the past year. 2. If so, what his duties were, and what remuneration he received, or is to receive. 3. Whether the said Cooke, in the capacity of a Government employee, visited Immigration Offices and Immigration Officials in the West. If so, whether he made any changes therein. 4. What changes were made, what the names of the officials are who were retired, given different positions, or newly employed. 5. Under what authority the said Cooke performed the mission referred to. 6. Whether the said Cooke is still in the employ of the Minister of Immigration and Colonization. If so, what duties he is now performing. 7. Whether the said Cooke is the Sheriff at Regina. Presented April 11, 1919.—*Mr. Murphy*.. .. ..*Not printed.*

190. Return to an Order of the House of the 3rd April, 1919, for a Return showing:—1. Amount paid to J. S. Wilson, of Hanover, Registrar for South East Grey, in connection with the Dominion Registration in June, 1918. 2. The names of the Deputy Registrars and their assistants who received payment for services in connection with the Dominion Registration of June, 1918, in the County of South East Grey, Ont. Presented April 14, 1919.—*Mr. Proulx*.. .. ..*Not printed.*

191. Return to an Order of the House of the 31st March, 1919, for a copy of all letters, telegrams and other correspondence between the Militia Department and the Aetna Chemical Company of Canada, Limited, concerning a contract for explosives. Presented April 14, 1919.—*Mr. Brouillard*.. .. ..*Not printed.*

192. Return to an Order of the House of the 19th March, 1919, for a Return showing:—1. The names and present addresses of the last three hundred appointees to the Inside Civil Service, whose appointments were made by the Civil Service Commission. 2. In what Departments they were placed when appointed, and the salary paid in each case. Presented April 14, 1919.—*Mr. Boyer*.. .. ..*Not printed.*

193. Return to an Order of the House of the 3rd April, 1919, for a Return showing:—1. Number of men enlisted under the provisions of the Military Service Act, 1917, in each of the nine provinces of Canada, who had been sent or were on their way overseas on November 11, 1918. 2. Number of enlisted under the provisions of the Military Service Act, 1917, in each of the nine provinces of Canada, who had been sent or had left their respective training barracks to be sent to Siberia on November 11, 1918. Presented April 14, 1919.—*Mr. Tobin*.. .. ..*Not printed*

194. Return to an Order of the House of the 24th March, 1919, for a copy of all telegrams, letters, order papers or other correspondence in any way connected with the discharge of cargoes of the vessels *J. M. Rafuse* and *W. F. Davidson*, in the year 1918, in New York Harbour. Presented April 14, 1919.—*Mr. Sinclair, (Antigonish)*.. ..*Not printed.*

195. Return to an Order of the House of the 7th April, 1919, for a copy of the evidence given in the arbitration at Toronto in 1918, with respect to the value of Canadian Northern Railway common stock taken over by the Government. Presented April 15, 1919.—*Mr. Mackie, (Edmonton)*.. .. ..*Not printed.*

195*a*. Return to an Order of the House of the 7th April, 1919, for a copy of all reports made, or letters written, by Graham A. Bell with respect to Canadian Northern Railway common stock, and also in connection with or leading up to the arbitration in 1918 with respect to the value of such common stock. Presented April 15, 1919.—*Mr. Mackie, (Edmonton)*.. .. ..*Not printed.*

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196. Return to an Order of the House of the 31st March, 1919, for a copy of all letters, telegrams and other correspondence between the Honourable N. W. Rowell, President of the Privy Council, and Commissioner R. H. Pringle, K.C., in any way relating to the Pulp and Paper Inquiry conducted by the said Commissioner. Presented April 15, 1919.—*Mr. Tobin*.. .. ..*Not printed.*

197. Also,—Return to an Order of the House of the 19th March, 1919, for a Return showing:—1. Whether the Canadian authorities have been in supreme command of the Canadian Naval vessels since the outbreak of hostilities. 2. How many vessels comprised the Canadian Naval Service on December 31, 1914, 1915, 1916, 1917 and 1918, respectively. Presented April 15, 1919.—*Mr. Tobin*.. .. ..*Not printed.*

198. Return to an Order of the House of the 7th April, 1919, for a Return showing, according to the latest available figures, the population of each of the four western provinces and of the cities of Victoria, Vancouver, Calgary, Edmonton, Regina, Saskatoon, Brandon and Winnipeg. Presented April 16, 1919.—*Mr. Middlebro*.. ..*Not printed.*

199. Return showing:—1. The value of, rate of duty on, and customs duty collected on, agricultural implements imported into Canada during the fiscal year ending March 31, 1914, and during the last fiscal year for which the figures are available, respectively. 2. The rate of duty on, amount of duty collected on, and number and value of, each of the following agricultural implements imported into Canada during each of the above periods: reapers, mowers, binders, thrashing machines, separators, ploughs, harrows, horserakes, seed drills, farm tractors, fanning mills, internal combustion engines other than tractors, wagons, buggies, cutters, sleighs, cream separators and wind mills. 3. What proportion of the above were imported through ports of entry in the four western provinces, and the duty paid thereon. 4. The number and value of such articles exported from Canada during the said two years respectively. 5. The number and value of automobiles imported into the four western provinces in the fiscal years ending March 31, 1914 to 1918, respectively, inclusive, and the duty paid thereon. Presented April 16, 1919.—*Mr. Middlebro*.. .. ..*Not printed.*

200. Statement of Expenditure by the Honourary Advisory Council for Scientific and Industrial Research during the fiscal year ending 31st March, 1918. Presented by Hon. Mr. Maclean, April 23, 1919.. .. ..*Not printed.*

201. Report of the Honourable Mr. Justice Morrison in the case of the wreck of the SS. *Princess Sophia.* Presented by Hon. Mr. Ballantyne, April 23, 1919.. ..*Not printed.*

202. Return to an Order of the House of the 19th March, 1919, for a copy of all correspondence, petitions and other papers concerning the steamer service between Magdalen Islands and Pictou, N.S. Presented April 23, 1919.—*Mr. Lemieux*.. .. ..*Not printed.*

203. Return to an Address to His Excellency the Governor General of the 19th March, 1919, for a copy of the Order in Council authorizing the audit of public terminal elevators and copy of the Auditor's report. Presented April 23, 1919.—*Mr. Stevens. Not printed.*

204. Return to an Order of the House of the 19th March, 1919, for a Return showing:—1. The number of Canadian soldiers who enlisted under the provisions of the Military Service Act, 1917, and are now in Siberia. 2. Whether any of the said soldiers objected to doing military service in Siberia. 3. If so, to whom such objections were referred. 4. The ruling given upon said objections. Presented April 23, 1919.—*Mr. Tobin.* *Not printed.*

205. Copies of Order in Council, P.C. 869, dated 22nd April, 1919, respecting allowances to be paid to Soldier Settlers who are taking agricultural training. Presented by Hon. Mr. Meighen, April 25, 1919.. .. ..*Not printed.*

205*a*..Copy of Order in Council, P.C. 912, dated 1st May, 1919, amending Order in Council, P.C. 869, dated 22nd April, 1919, respecting allowances to be paid to Soldier Settlers who are taking agricultural training. Presented by Hon. Mr. Meighen, May 19, 1919. *Not printed.*

206. Return to an Order of the House of the 31st March, 1919, for a copy of all letters, telegrams, correspondence and other documents exchanged between the Starch Manufacturers of Prince Edward Island and the Finance Department, or any other Department of the Government, in 1911, in reference to the then proposed reciprocity agreement between Canada and the United States. Presented April 25, 1919.—*Mr. Read, (Prince)*.. .. ..*Not printed.*

207. Return to an Order of the House of the 20th March, 1919, for a Return showing:—1. The amount, if any, paid by the Government for advertising to the *Moncton Transcript, Acadian Recorder, Morning Chronicle, Halifax Herald,* and *Evening Mail,* during the year 1918. 2. The amounts, if any, paid to the said newspapers during the same year for printing. Presented April 25, 1919.—*Mr. Duff* .. ..*Not printed.*

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207a. Supplementary Return to an Order of the House of the 20th March, 1919, for a Return showing:—1. The amount, if any, paid by the Government for advertising to the *Moncton Transcript, Acadian Recorder, Morning Chronicle, Halifax Herald,* and *Evening Mail,* during the year 1918. 2. The amounts, if any, paid to the said newspapers during the same year for printing. Presented June 2, 1919.—*Mr. Duff..Not printed.*

208. Return to an Order of the House of the 19th March, 1919, for a Return showing:—1. The amount paid the *Bridgewater Bulletin,* of Bridgewater, Nova Scotia, for advertising since January 1, 1912. 2. The amount paid the *Daily and Weekly News,* of Lunenburg, Nova Scotia, for advertising since January 1, 1912. Presented April 25, 1919.—*Mr. Duff.. .. ..Not printed.*

209. Return to an Order of the House of the 20th March, 1919, for a Return showing:—1. What quantity of soap was purchased by the Government from the Palm Olive Company in 1917 and 1918. 2. The price paid for same. Presented April 25, 1919.—*Mr. Lemieux.. .. ..Not printed.*

210. Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amounts, if any, paid by the Government to the *Winnipeg Telegram* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented April 25, 1919.—*Mr. Mayrand.. .. .. Not printed.*

210a. Supplementary Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amounts, if any, paid by the Government to the *Winnipeg Telegram* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented June 2, 1919.—*Mr. Mayrand.. ..Not printed.*

211. Return to an Order of the House of the 6th May, 1918, for a Return showing:—1. The amount paid for sending cablegrams by each Department of the Government for the year ending March 31, 1918. 2. What has been paid by each of the several departments for sending telegrams and telephone messages. 3. Whether the Government or any department thereof receives a special rate, or whether the full commercial rate is paid in connection with sending cablegrams, telegrams and telephone messages. 4. If not, whether it is the intention of the Government to endeavour to arrange for a special rate. Presented April 28, 1919.—*Mr. Sutherland.. .. .. ..Not printed.*

212. Return to an Order of the House of the 6th May, 1918, for a Return showing:—1. The amount paid by the Government to each of the following newspapers:—Charlottetown *Guardian,* Charlottetown *Examiner, Island Patriot,* Summerside *Journal Agriculturist, Pioneer and Farmer,* Charlottetown *Herald,* Charlottetown *Watchman,* from the 1st of August, 1914, to the 1st of January, 1918. 2. The portion of the amount so paid for advertising in connection with the war. Presented April 28, 1919.—*Mr. Read (Prince.) .. ..Not printed.*

213. Return to an Order of the House of the 7th April, 1919, for a Return showing:—1. The nature of the irregularities of which Major L'Heureux is charged in connection with the administration of the 167th Battalion. 2. Whether the Government is aware that the Adjutant of the said Battalion, Captain J. A. Poirier, who shared the Commanding Officer's confidence, was not at all disquieted, but, on the contrary, was sent overseas immediately after the termination of Lieut.-Colonel Readman's trial. 3. The charges alleged against the said Major L'Heureux and who investigated said charges. 4. Whether Major L'Heureux was called upon to enter a plea of defence. 5. Whether the Government is aware that on several occasions said Major L'Heureux demanded an investigation, and that the reply was that there was nothing for which to reproach him. Presented April 28, 1919.—*Mr. Savard.. .. .. ..Not printed.*

214. Return to an Order of the House of the 18th April, 1918, for a Return showing:—1. The number of clerks employed during each year from 1911 to 1917 in the following Post Offices: Victoria, Vancouver, Regina, Edmonton, Winnipeg, Toronto, Ottawa, Hamilton, Montreal, Quebec, Fredericton and Halifax. 2. What sums have been paid as salaries to the clerks of the above offices in each year of the said period. Presented April 28, 1919.—*Mr. Déchene.. .. ..Not printed.*

215. Return to an Order of the House of the 1st May, 1918, for a Return showing:—(*a*) Whether the Canadian Government Railways Employees Magazine, published at Moncton, N.B., is owned by the Government; (*b*) if so, the names of the Editor, Business Manager, Advertising Solicitor, and of other persons engaged in connection with the magazine and the amounts of salary or other remuneration paid to them, respectively, since its establishment; (*c*) the positions, if any, such persons also occupy in the Canadian Government Railways Service, and what salaries they receive in such service; (*d*) the revenue and expenditure in connection with the publication of the magazine from its inception to December 31, 1917, showing separately the amounts received from advertising, subscriptions, and from other sources respectively, also separately the amounts disbursed for personal service, printing and other expenses of publication; (*e*) the sums of money paid by the Government or by the Canadian

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Government Railways in connection with the publication of the magazine with dates and amounts and showing for what purposes such payments were made; (*f*) a copy of the correspondence between the Minister of Railways and Canals, any officials of that Department, particularly the Purchasing Agent, the General Manager and other officials of the Canadian Government Railways and any officials or employees of the Magazine and of all correspondence from the Minister or from any officials of the Department or from any officials of the Canadian Government Railways for the purpose of inducing manufacturers and others to advertise in the magazine; and (*g*) whether the Post Office Department has admitted the Magazine to second-class postal privileges, and if so, on what date, and whether such privileges extend only to copies sent to bona fide subscribers or if they include copies supplied gratuitously to Canadian Government Railways officials and employees. Presented April 28, 1919.—*Mr. Bureau.* *Not printed.*

216. Return to an Order of the House of the 24th March, 1919, for a Return showing:—1. The staff and personnel employed at Quebec, Que., for the Soldiers' Civil Re-establishment. 2. Their respective names, domiciles and salaries. 3. Which of them are returned soldiers, and what services they performed in the Canadian Expeditionary Force. 4. How many demands were made by returned soldiers at Quebec in connection with their civil re-establishment, giving: (*a*) Name of claimant; (*b*) His place of origin; (*c*) The nature and date of his demand; (*d*) The adjudication in each case, and date. Presented April 29, 1919.—*Mr. Vien* .. ..*Not printed.*

217. Return to an Address to His Excellency the Governor General, of the 19th March, 1919, for a copy of all correspondence between the Minister of Trade and Commerce or any officials of the Government and the Board of Grain Supervisors and Board of Grain Commissioners regarding the commandeering of wheat in 1916, and a copy of the Order in Council authorizing same. Presented April 29, 1919.—*Mr. Stevens.* *Not printed.*

218. Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Ottawa Journal* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented April 29, 1919.—*Mr. Deslauriers*.. .. .. ..*Not printed.*

218*a*. Return to an Order of the House of the 24th March, 1919, for a Return showing:—1. Amount paid to the *Ottawa Journal* and *Ottawa Journal-Press* for Government printing, advertising and job work from 1896 to 1911, inclusive. 2. Amounts paid to *Ottawa Journal* and *Ottawa Journal-Press* for Government printing, advertising and job work in each of the years 1912, 1913, 1914, 1915, 1916, 1917 and 1918. Presented May 14, 1919.—*Mr. Edwards*.. .. ..*Not printed.*

218*b*. Supplementary Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Ottawa Journal* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented June 2, 1919.—*Mr. Deslauriers*...*Not printed.*

219. Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Hamilton Spectator* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented April 29, 1919.—*Mr. Deslauriers*.. ..*Not printed.*

219*a*. Supplementary Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Hamilton Spectator* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented April 29, 1919.—*Mr. Deslauriers*.. ..*Not printed.*

220. Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Ottawa Citizen* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented April 29, 1919.—*Mr. Deslauriers*.. .. ..*Not printed.*

220*a*. Supplementary Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Ottawa Citizen* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented June 2, 1919.—*Mr. Deslauriers*..*Not printed.*

221. Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Toronto World* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented April 29, 1919.—*Mr. D'Anjou*.. .. .. ..*Not printed.*

221*a*. Supplementary Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Toronto World* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented June 2, 1919.—*Mr. D'Anjou*.. ..*Not printed.*

CONTENTS OF VOLUME 10—*Continued.*

222. A collection of Reports by the Imperial Government on Bolshevism in Russia. Presented by Hon. Mr. Rowell, April 29, 1919.. .. ..*Not printed*

223. Return to an Order of the Senate dated May 22, 1918. That an humble Address be presented to His Excellency the Governor General, praying that His Excellency will cause to be laid upon the Table of the Senate a return of copies of all papers, letters, telegrams, memorials, petitions or other communications or documents in the possession of the Government or in that of His Honour the Speaker of the House of Commons, which may be available, in connection with the recent delegation from the farmers of Canada to present certain public and national questions and issues to the attention of the Cabinet and of the Parliament of Canada.—(*The Senate.*) April 29, 1919.. .. ..*Not printed.*

224. Return to an Order of the Senate dated 26th March, 1919, showing:—1. (1) Whether the Government has divested itself of all aerodromes, airships and air service plant. (2) Also, whether such property is retained by the Government, where it is situated, and of what does it consist. 2. (1) Also, is there any air service organization or personnel in Canada acting under the Government; and (2) If there is: (*a*) of what persons does it consist; (*b*) what is the qualification and rank of each person; (*c*) where are they respectively located; (*d*) what is each person's duty.—(*The Senate.*) April 29, 1919 .. ..*Not printed.*

225. Return to an Order of the House of the 24th March, 1919, for a copy of all telegrams, letters, correspondence, petitions and other documents in any way referring to the appointment of a postmaster at Port Hawkesbury, during the years 1918 and 1919. Presented April 30, 1919.—*Mr. Chisholm*.. .. ..*Not printed.*

226. Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Toronto Mail and Empire* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented April 30, 1919.—*Mr. Proulx*.. ..*Not printed.*

226*a*. Supplementary Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Toronto Mail and Empire* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented June 2, 1919.—*Mr. Proulx.* *Not printed.*

227. Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Toronto Star* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented April 30.—*Mr. Deslauriers* .. ..*Not printed*

227*a*. Supplementary Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Toronto Star* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented June 2, 1919.—*Mr. Deslauriers*.. ..*Not printed.*

228. Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Montreal Star* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented April 30, 1919.—*Mr. Mayrand*.. .. ..*Not printed*

228*a*. Supplementary Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Montreal Star* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented June 2, 1919.—*Mr. Mayrand.* *Not printed.*

229. Copy of an agreement between His Britannic Majesty's Government and the Government of the French Republic respecting British War Graves in France, signed at Paris November 26, 1918. Presented by Hon. Mr. Rowell, April 30, 1919 ..*Not printed.*

230. Mr. Rowell, a Member of the King's Privy Council, laid before the House,—Copy of Order in Council, P.C. 2144, dated 2nd September, 1918, *re* application of the St. Lawrence River Power Company to construct certain works in the South Sault Channel of the St. Lawrence River.

P.C. 2145, dated 2nd September, 1918, appointing the Hon. Arthur Meighen, Minister of the Interior, and Hon. A. L. Sifton, Minister of Customs and Inland Revenue, to represent the Government of Canada at a conference with the representatives of the United States Government concerning the application of the St. Lawrence River Power Company.

P.C. 2509, dated 12th October, 1918,—Copy of report *re* result of negotiations concerning the application of the St. Lawrence River Power Company, and also in reference to the Order of the International Joint Commission authorizing the St. Lawrence River Power Company to construct certain works in the South Sault Channel of the St. Lawrence River.

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Copy of the Order of the said International Joint Commission authorizing the construction of the said works dated September 4, 1918. Interim Order and Opinion of International Joint Commission in the matter of the application of the St. Lawrence River Power Company for the approval of the construction and maintenance of a submerged weir in the South Channel of the St. Lawrence River near the mouth of its power canal at Massena, New York. Statement of the Case of the Government of the Dominion of Canada on such application. Presented by Hon. Mr. Rowell May 1, and 3, 1919.. .. ..*Printed for distribution and sessional papers.*

230a. Interim Order, Opinions of, and Hearings before the International Joint Commission in the matter of the application of the St. Lawrence River Power Company, for the approval of the construction and maintenance of a submerged weir in the south channel of the St. Lawrence River near the mouth of its power canal at Massena, New York. Presented by Hon. Mr. Rowell, May 14, 1919.

231. Copy of the Order of the International Joint Commission, in the matter of the measurement and apportionment of the St. Mary and Milk Rivers and their tributaries in the State of Montana and the Provinces of Alberta and Saskatchewan. Presented by Hon. Mr. Rowell, May 30, 1919.. .. ..*Not printed.*

232. Return to an Order of the House of the 28th April, 1919, for a copy of Mrs. Hambleton's report, dated in the month of May, 1918, and relating to Canadian flour mills. Presented May 1, 1919.—*Mr. Archambault*.. .. ..*Not printed*

233. Return to an Order of the House of the 27th March, 1919, for a Return showing:—Amount expended by the Government on newspaper advertising since August 4, 1915. Presented May 31, 1914.—*Mr. Sinclair*.. .. ..*Not printed.*

233a. Supplementary Return to an Order of the House of the 27th March, 1919, for a Return showing:—Amount expended by the Government on newspaper advertising since August 4, 1915, Presented June 2, 1919.—*Mr. Sinclair (Antigonish)*..*Not printed.*

234. Return to an Order of the House of the 7th April, 1919, for a copy of all correspondence in connection with the lease of the Government Fish Drier at Souris, Prince Edward Island, including copy of the advertisement calling for tenders on the 15th day of May, 1914, and a copy of the lease. Presented May 31, 1919.—*Mr. McIsaac.*
Not printed.

235. Return to an Order of the House of the 19th March, 1919, for a copy of all letters, telegrams, petitions and other documents in any way referring to a proposed mail route from Eden Siding to Marble Mountain, Inverness County, N.S. Presented May 1, 1919.—*Mr. Chisholm*.. .. ..*Not printed.*

236. Communication from the Senate of Belgium to the Speakers of the Senate and House of Commons of Canada.

(*Translation*).

BRUSSELS, BELGIUM, April 30, 1919.

The Speaker of the House of Commons,
The Speaker of the Senate,
Ottawa.

Mr. SPEAKER,—I beg to send you and request you to communicate to the Assembly over which you preside the text of the motion unanimously adopted by the Senate during its session of Tuesday, April 29, 1919.

The Senate of Belgium affected by the vote of the Paris Conference which disregards the claims of the City of Brussels to become the seat of the League of Nations, seriously preoccupied by the distressing condition to which the country has been reduced by this most cruel war and convinced that the numberless ruins which cover its territory cannot be restored by its own national resources, most anxiously appeals to your Assembly and implores it to intervene with the greatest possible energy in order to obtain that the solemn promises of prompt and complete restoration so frequently reiterated be now carried out in the spirit of broad equity and generous compassion which inspired them.

Relying upon the sentiments of solidarity which unite all civilized nations and upon the assurance of sincere and profound sympathy which your Assembly so kindly gave to Belgium, the Senate counts upon obtaining from your Assembly its powerful aid and effectual intervention in support of the legitimate and necessary atonements claimed from the Paris Conference for the restoration of this country.

Please accept, Mr. Speaker, the assurance of my greatest respect.

(Signed) Baron de PAVEREAU,
President of the Senate.

Presented by Hon. Mr. Speaker, May 1, 1919.. .. ..*Not printed.*

CONTENTS OF VOLUME 10—*Continued.*

237. Return to an Order of the House of the 23rd April, 1919, for a copy of all correspondence, telegrams and other documents exchanged between Mr. L. D. Hara, Acting Superintendent of the Welland Ship Canal, and the Department of Railways and Canals and Justice Department, relative to the seizure of two cars of coal by the Fuel Controller of Thorold, Ont. Presented May 2, 1919.—*Mr. Fraser*.. .. ..*Not printed.*

238. Return to an Order of the House of the 23rd April, 1919, for a copy of all correspondence, telegrams and other documents exchanged between Mr. L. D. Hara, Acting Superintendent of the Welland Ship Canal, and the Minister of Railways and Canals or any other person in the said Department relative to notice being served on Mrs. W. Thomas, of Thorold, Ont., to vacate her residence. Presented May 2, 1919.—*Mr. Fraser*.. .. ..*Not printed.*

239. Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Manitoba Free Press* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented May 2, 1919.—*Mr. Mayrand* .. .. ..*Not printed.*

239a. Supplementary Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Manitoba Free Press* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented June 2, 1919.—*Mr. Mayrand*..*Not printed.*

240. Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Halifax Herald* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented May 2, 1919.—*Mr. Proulx*.. .. ..*Not printed.*

246*a*. Supplementary Return to an Order of the House of the 19th Mrach, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Halifax Herald* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented June 2, 1919.—*Mr. Proulx*.. ..*Not printed.*

241. Return to an Order of the House of the 23rd April, 1919, for a return showing how many acres of public land have been given to railway companies in the Dominion of Canada by the Federal Government from 1878 to the present time, and also showing how many acres were granted in each year during the above period of time. Presented by Hon. Mr. Meighen, May 2, 1919.. .. ..*Not printed.*

242. Return to an Order of the House of the 14th April, 1919, for a copy of all documents, correspondence and plans relating to the proposed construction of the Montreal Harbour Commissioners' bridge, extending from the City of Montreal to the South Shore. Presented May 5, 1919.—*Mr. Deslauriers*.. .. ..*Not printed.*

243. Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Toronto News* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented May 5, 1919.—*Mr. Proulx*.. .. ..*Not printed.*

243*a*. Supplementary Return to an Order of the House of the 19th Mrach, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Toronto News* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented June 2, 1919.—*Mr. Proulx*.. ..*Not printed*

244. Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Toronto Globe* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented May 5, 1919.—*Mr. Deslauriers*.. .. ..*Not printed.*

244*a*. Supplementary Return to an Order of the House of the 19th Mrach, 1919, for a Return showing:—The amount, if any, paid by the Government to the *Toronto Globe* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented June 2, 1919.—*Mr. Deslauriers*..*Not printed.*

245. Return to an Order of the House of the 23rd April, 1919, for a copy of all telegrams, letters and other correspondence exchanged between L. D. Hara or other persons connected with the Welland Ship Canal and the Department of Railways and Canals relative to the drowning of Michael Koebel, Lock Tender at Port Colborne. Presented May 5, 1919.—*Mr. Fraser*.. .. ..*Not printed.*

246. Report of the Director of the Military Service Branch on the operation of the Military Service Act, 1917. Presented by Hon. Mr. Meighen, May 6, 1919.. .. ..*Not printed.*

CONTENTS OF VOLUME 10—*Continued.*

246a. Copy of a letter from Mr. Justice Duff, Central Appeal Judge, respecting his appreciation of the work of Mr. S. L. Dale Harris as Central Public Representative in connection with the administration of the Military Service Act. Presented by Sir Robert Borden, June 24, 1919.. .. ..*Not printed.*

247. Return to an Order of the House of the 14th April, 1919, for a copy of all documents relating to the investigation made by His Honour, Judge F. S. McLennan, in the matter of the soldiers' votes which were deposited at the St. John Barracks, in connection with the General Elections held on the 17th December, 1917; also a copy of the report thereon by the investigating commissioner, comprising the evidence and exhibits relating thereto, and copy of the correspondence and telegrams between the said Commissioner and members of the Government, together with statements of accounts in connection therewith. Presented May 6, 1919.—*Mr. Archambault.* *Not printed.*

248. Return to an Order of the Senate dated March 25, 1919, showing:—1. Copies of all Orders in Council for the years 1915, 1916, 1917 and 1918 giving authority for the free importation of machinery and manufactured products or for importation at a lesser rate of duty than provided for in the customs tariff. 2. Classification of machinery or manufactured products so imported. 3. The value thereof. 4. Port or ports of entry. 5. Country of origin.—(*The Senate.*) May 6, 1919.. ..*Not printed.*

249. Return to an Order of the House of the 28th April, 1919, for a Return showing:—1. Quantity of tons of lead pipe, or waste lead pipe, imported into Canada from United States during 1918, and at what ports of entry. 2. Quantity of tons of the different sizes, more particularly 4-inch pipes, so imported. 3. The names of the firms in the United States so exporting. 4. The names of the firms in Canada so importing. Presented May 7, 1919.—*Mr. Lemieux*.. .. ..*Not printed.*

250. Return to an Order of the House of the 2nd April, 1919, for a copy of all correspondence, letters, telegrams and recommendations relating to the appointment of a keeper of Free Stone Island light-house, County of Richmond, Nova Scotia, in the year 1918. Presented May 7, 1919.—*Mr. Duff*.. .. ..*Not printed.*

251. Return to an Order of the House of the 31st March, 1919, for a Return showing amounts paid by the Government for advertising to the following papers: *Dundalk Herald, Flesherton Advance, Markdale Standard, Durham Chronicle, Hanover Post,* and *Grey* (Durham) *Review* during the year ending March 26, 1919. Presented May 7, 1919.—*Mr. Proulx*.. .. ..*Not printed.*

252. Return to an Order of the House of the 31st March, 1919, for a Return showing amounts paid the *Toronto Globe* and *Toronto Star*, respectively, for Government advertising during the year ending March 26, 1919. Presented May 7, 1919.—*Mr. Proulx.* *Not printed.*

252a. Supplementary Return to an Order of the House of the 31st Mrach, 1919, for a Return showing amounts paid the *Toronto Globe* and *Toronto Star*, respectively, for Government advertising during the year ending March 26, 1919. Presented June 2, 1919.—*Mr. Proulx*.. .. ..*Not printed.*

253. Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amounts, if any, paid by the Government to the *Montreal Gazette* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented May 8, 1919.—*Mr. Mayrand*.. .. ..*Not printed.*

253a. Supplementary Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amounts, if any, paid by the Government to the *Montreal Gazette* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented June 2, 1919.—*Mr. Mayrand*..*Not printed.*

254. Return to an Order of the House of the 16th April, 1919, for a copy of all correspondence, telegrams and other documents in connection with the application of the Shell Transport and Trading Company for the grant of certain oil lands. Presented May 12, 1919.—*Mr. Lemieux*.. .. ..*Not printed.*

255. Report of the Ministry Overseas Military Forces of Canada, 1918. Presented by Sir Edward Kemp, May 12, 1919.. .. ..*Not printed.*

256. Return to an Order of the House of the 12th May, 1919, for a copy of the lease or leases granting the use of some 10,000 acres of land of the St. Peter's Indian Reserve for a term of five years from the first of May, 1918, to Charles Bird and Jacob Jonnason, of St. Peters, and Rufus Stephen Benson and Rufus Henrickson of Selkirk. Presented May 14, 1919.—*Mr. Robb*.. .. ..*Not printed.*

CONTENTS OF VOLUME 10—*Continued.*

257. Return to an Order of the House of the 19th March, 1919, for a Return showing:—1. The amount of money the Government has spent during the last twelve months advertising in the daily and weekly papers and periodicals or magazines (*a*) in Canada, and (*b*) outside of Canada. 2. Whether the Government paid a higher rate for this advertising than if they had placed it through the regular advertising agencies. Presented May 14, 1919.—*Mr. Pedlow*.. .. ..*Not printed.*

257a. Supplementary Return to an Order of the House of the 19th March, 1919, for a Return showing:—1. The amount of money the Government has spent during the last twelve months advertising in the daily and weekly papers and periodicals or magazines (*a*) in Canada, and (*b*) outside of Canada. 2. Whether the Government paid a higher rate for this advertising than if they had placed it through the regular advertising agencies. Presented June 2, 1919.—*Mr. Pedlow*.. .. ..*Not printed.*

258. Copies of contracts with respect to the reconstruction of the Parliament Building. Presented by Hon. Mr. Carvell, May 15, 1919.. .. ..*Not printed.*

259. Return to an Order of the House of the 28th April, 1919, for a Return showing:—1. The number of Canadian Officers belonging to the Canadian Expeditionary Force promoted to the rank of Brigadier-General since the beginning of the war, to date. 2. Their names, the military rank which they held at the time they left for overseas, and the military district to which they belong. Presented May 19, 1919.—*Mr. Prevost.* *Not printed.*

260. Return to an Order of the House of the 23rd April, 1919, for a copy of all correspondence, petitions and other documents concerning the prosecution entered against Mr. Ben H. Spence, Secretary of the Ontario Branch of the Dominion Alliance, for publishing objectionable matter. Presented May 19, 1919.—*Mr. Lemieux*.. .. ..*Not printed.*

261. Return to an Order of the House of the 7th May, 1919, for a Return showing:—1. Names of the private cars that were in the wreck on the Toronto and Ottawa train (Canadian National Railways, 21st-22nd April last), and the name of the respective Minister to which each private car is assigned. 2. Who paid for the attendance, transportation and supplies for these private cars respectively, during the trip. 3. The amount of damage which resulted from this wreck for each private car and by whom the said damage will be paid. 4. Number of private cars used by Ministers and high officials of the Government, the name of each car, and the name of each Minister and high official using same. 5. How many of these private cars, if any, have been used from time to time since 1911, by members of the family of the Ministers or high officials exclusively for social and pleasure trips. Presented May 19, 1919. —*Mr. D'Anjou*.. .. ..*Not printed.*

262. Return to an Order of the House of the 16th April, 1919, for a Return showing:—1. Amount paid by the Government to the Canadian Press Association during the calendar year 1918. 2. Whether the advertising for the last Victory Loan was distributed to the newspapers directly by the Department of Finance, or through advertising agencies. 3. If through advertising agencies, how much was paid in commissions to the advertising agents. 4. The total cost of advertising the last Victory Loan. Presented May 19, 1919.—*Mr. Sinclair, (Antigonish)*.. .. ..*Not printed.*

263. Return to an Order of the House of the 12th May, 1919, for a Return showing:—1. Name of the Deputy Minister of the Department of Soldiers' Civil Re-Establishment. 2. When he was appointed. 3. His salary. 4. Whether he is a returned soldier. 5. If not, whether any attempt was made to obtain the services of a returned soldier. 6. Whether the present Deputy Minister has any special qualifications which would fit him to deal with returned men and their problems. 7. What educational experience the present Deputy Minister has. 8. Whether he is familiar with principles of education. 9. Why Mr. Sedgeworth resigned from the position of Director of Vocational Training. 10. Whether Mr. Sedgeworth had any disagreement with the Minister or Deputy Minister on matters of policy affecting the welfare of returned men. 11. Number of people employed on the Publicity Staff of the Department of Soldiers' Civil Re-Establishment, and salary paid to each. 12. Amount expended by this Department during the past six months for publicity purposes. 13. Whether it is true that only returned officers are offered the higher positions in this Department. 14. Whether the previous appointments held by Mr. Sedgeworth and Mr. Robinson were made through the Civil Service Commission. 15. Whether the position of Secretary of the Pension Board has been advertised. Presented May 19, 1919.—*Mr. Power.* *Not printed.*

264. Return to an Order of the House of the 19th March, 1919, for a Return showing:—1. The total number of men recruited during the war, combatants and non-combatants, (*a*) in the whole of Canada; (*b*) in each province. 2. The total number of men recruited during the war in Canada, (*a*) as per nationality; (*b*) as per religion; (*c*) as per nationality provincially; and (*d*) as per religion provincially. 3. The total

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number of men defranchised in Canada, (*a*) in the whole of Canada; (*b*) in each province. 4. The total number of men and women engaged in war work, (*a*) in Canada; (*b*) in each province. Presented May 20, 1919.—*Mr. Blake*.. ..*Not printed.*

265. Return to an Order of the House of the 23rd April, 1919, for a copy of the report made by Lt. Jarvis, R.C.N., in regard to the steamer *Stadacona*. Presented May 21, 1919. —*Mr. Duff*.. .. ..*Not printed.*

265a Return to an Order of the House of the 7th May, 1919, for a Return showing:—1. Whether H.M.C.S. *Stadacona* was repaired by the Halifax Shipyards, Ltd., during the summer of 1918. 2. If so, why repairs were necessary. 3. Cost of the repairs. 4. Whether the *Stadacona* struck a rock on the Cape Breton coast during the year 1918. 5. If so, who was held responsible for the striking of said rock. 6. How many times during the war the *Stadacona* has been aground. 7. Where the vessel was during the month of July, 1917. 8. Whether she, during July, 1917, took a party of Naval Officers to Labrador. 9. If so, the purpose of this trip. 10. Whether the ship was in constant communication with the Naval authorities during that trip. 11. Whether the *Stadacona* was used as a yacht, or to provide living accommodation for any officers in the Canadian Naval Service during 1917 or 1918. Presented May 30, 1919.—*Mr. D'Anjou*.. .. .. *Not printed.*

266. Return to an Order of the House of the 5th May, 1919, for a Return showing:—1. Value of farm implements exported during the years 1912, 1913, 1914, 1915, 1916, 1917 and 1918. 2. To which countries the said implements were exported, and who the exporters were. 3. Whether any tractors were exported. Presented May 20, 1919.—*Mr. Dechene.* *Not printed.*

267. Return to an Order of the House of the 23rd April, 1919, for a copy of all correspondence, petitions and other papers concerning the proposed acquisition by the Dominion Government of the Gaspé Railway System. Presented May 28, 1919.—*Mr. Lemieux.* *Not printed.*

268. Return to an Order of the House of the 19th March, 1919, for a return showing the names, post office addresses, length of service, date of appointment, and yearly remuneration of all fishery guardians in the Province of Nova Scotia, along with a list of the names of the parties by whom the said guardians were recommended. Presented May 28, 1919.—*Mr. Sinclair, (Antigonish)* .. ..*Not printed.*

269. Report of The War Trade Board, from 8th February, 1918 to 31st March, 1919. Presented by Hon. Mr. Maclean, May 28, 1919... *Printed for distribution and sessional papers.*

270. Return to an Order of the Senate, dated May 13, 1919, showing:—1. A copy of the evidence taken on an inquiry of the Department of Railways through the claims agent at Moncton, New Brunswick, into the claim of Mrs. Annie Girroir, of Tracadia, Nova Scotia, widow, for damages to her property by water claimed to have been caused by the narrowing of the railway bridges opposite said property. 2. The names of the witnesses examined. 3. The time spent at said examination. 4. The place where said examination was held. 5. Whether the claimant was present or was represented by Counsel at said inquiry. 6. Whether the claimant was given notice of said inquiry. 7. What length of notice was given claimant previous to the date set for said inquiry. 8. A copy of the decision of the Legal Department of Railways with regard to said claim. (*The Senate.*) May 29, 1919.. .. .. *Not printed.*

271. Return to an Order of the House of the 19th March, 1919, for a copy of all correspondence, letters and other documents exchanged between the Government or any Department or Commission thereof and Lieutenant Commander J. K. L. Ross, relating to appointments to the staff of the Board of Pension Commissioners, by the Civil Service Commission. Presented May 30, 1919.—*Mr. Kay*.. .. ..*Not printed.*

271a. Return to an Order of the House of the 23rd April, 1919, for a copy of all correspondence, and other documents exchanged between the Government or any Member thereof, or any Department or Commission thereof, and the Board of Pension Commissioners or any Member thereof, relative to appointments to the staff of the Board of Pension Commissioners by the Civil Service Commission. Presented July 5, 1919.—*Mr. Kay.* *Not printed.*

272. Return to an Order of the House of the 5th May, 1919, for a copy of all correspondence between the Government and the City of Quebec and other stockholders in Quebec, London, New York and elsewhere, with reference to the proposed purchase by the Government of the minority stock of the Quebec and Lake St. John Railway and of the Great Northern Railway of Canada, now forming part of the mileage of the Canadian Northern Railway operated by the Government. Presented May 30, 1919.—*Mr. Lavigueur*.. .. ..*Not printed.*

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272*a*. Return to an Order of the House of the 23rd April, 1919, for a copy of all correspondence, between the Government, the City of Quebec and other shareholders of the Great Northern Railway Company of Canada and the Quebec and Lake St. John Railway, as to the acquisition by the Government of the minority holdings of the stock in these railways, which are now being operated by the Government as part of the Canadian National Railway System. Presented May 30, 1919.—*Mr. Lavigueur*.. ..*Not printed.*

272*b*. Supplementary Return to an Order of the House of the 5th May, 1919, for a copy of all correspondence between the Government and the City of Quebec and other stockholders in Quebec, London, New York and elsewhere, with reference to the proposed purchase by the Government of the minority stock of the Quebec and Lake St. John Railway and of the Great Northern Railway of Canada, now forming part of the mileage of the Canadian Northern Railway operated by the Government. Presented June 19, 1919.—*Mr. Lavigueur*.. .. ..*Not printed.*

273. Return to an Order of the House of the 8th May, 1919, for a copy of all telegrams, letters, petitions and other documents, exchanged between the Post Office Department and any person in Inverness County during 1918 and 1919, in any way referring to the mail contract for carrying the mails from Inverness Railway Station to Margaree Harbour, N.S. Presented May 30, 1919.—*Mr. Chisholm*.. ..*Not printed.*

274. Return to an Order of the House of the 7th May, 1919, for a Return showing:—1. The refit cost for Canadian trawler *Vimy* during the year 1918. 2. Whether the firm of Burns & Keeler, Halifax, did any work on trawler *Vimy*. 3. If so, amount paid for such work. 4. How long trawler *Vimy* was in Halifax during the year 1918. 5. What the duties of that vessel were in Halifax. Presented May 30, 1919,—*Mr. D'Anjou*.. .. ..*Not printed.*

275. Reports, Returns and Statistics of the Food and Drug Laboratories of the Department of Trade and Commerce, for the fiscal year ended March 31, 1919. Presented by Hon. Mr. Maclean, June 2, 1919.. .. ..*Not printed.*

276. Final Report of the Fuel Controller, from the establishment of the office in June, 1917, to March, 1919. Presented by Hon. Mr. Maclean, June 2, 1919....*Not printed*

277. Return to an Order of the House of the 22nd May, 1919, for a Return showing:—1. Whether any orders for the purchase of fish for shipment overseas were placed with any companies in Canada by the Canadian Government, or any department thereof, or the War Purchasing Commission, in the years 1915, 1916, 1917, 1918, 1919. 2. If so, what the names of the companies are, and the value of the orders placed with each. Presented June 2, 1919.—*Mr. Steele*.. .. ..*Not printed.*

277*a*. Return to an Order of the House of the 15th May, 1919, for a Return showing the quantities of fresh (frozen) and salt fish shipped from Canada to England, France and other allied countries overseas, under the direction of the Canadian Government, during the war, distinguishing between salt and fresh fish; also setting forth the quantities supplied to the Canadian troops overseas and the quantity sold to the ordinary consumer; also a statement in detail showing the names and Post Office addresses of the parties from whom the said fish was purchased and the prices paid therefor, respectively. Presented June 21, 1919.—*Mr. Sinclair (Antigonish.)* *Not printed.*

278. Return to an Order of the House of the 26th May, 1919, for a Return showing:—1. Whether Hadley B. Tremaine, M.P., for Hants, is in the employ of the Government of Canada or in any way connected with the Military Forces of Canada. 2. If so, when he was first appointed. 3. In what capacity he is so engaged, and what salary he receives. 4. Pay received from the outbreak of the war up to and including the 12th day of May, 1919. 5. Whether the wife of the said Hadley B. Tremaine is in receipt of separation allowance. If so, how much she has received to date. 6. If the said Hadley B. Tremaine was and is in receipt of pay from the Military Forces of Canada, whether he was and is in receipt of his indemnity as member of the Parliament of Canada. Presented June 2, 1919.—*Mr. D'Anjou*.. .. ..*Not printed.*

279. Report on Export of Electricity from Canada, and Report of the Power Controller. Presented by Hon. Mr. Maclean, June 2, 1919.. .. ..*Not printed.*

280. Return to an Order of the House of the 19th March, 1919, for a copy of all papers and correspondence concerning the installation of wireless equipment upon the steamers built or to be built for the Government as well as a copy of all tenders submitted and contracts executed in that connection since August 4, 1914. Presented June 5, 1919.—*Mr. McMaster*.. .. ..*Not printed.*

281. Letter of the Honourable T. A. Crerar, M.P., to the Right Honourable the Prime Minister resigning his position as Minister of Agriculture and the letter of the Prime Minister in acknowledgment thereof. Presented by Sir Robert Borden, June 6, 1919.. .. .. .. *Not printed.*

CONTENTS OF VOLUME 10—*Continued.*

282. Return to an Order of the House of the 9th April, 1919, for a Return showing:—1. How many attorneys residing and practising in the City of Montreal have been employed by the Government during the fiscal year which expired on March 31, 1919. 2. Their names and how much each one was paid for services rendered. Presented June 9, 1919.—*Mr. Tobin*.. .. ..*Not printed.*

283. Return to an Order of the House of the 21st May, 1919, for a Return showing:—1. Amounts paid to Morrison's Limited, or D. A. Morrison, Amherst, Nova Scotia, for supplies for the military camps and the Internment Camp at that place during the years 1915-16, 1916-17, 1917-18 and 1918-19. 2. Amounts paid Edgar Filmore, Amherst, Nova Scotia, during the above mentioned years. 3. From whom coal has been purchased for the Military Barracks, Armoury and Internment Camp at Amherst, Nova Scotia, during the above mentioned years. 4. Cost per ton for coal so supplied. Presented June 9, 1919.—*Mr. Chisholm*.. .. ..*Not printed.*

284. Return to an Order of the House of the 28th May, 1919, for a Return showing:—1. Number of applications for divorce bills received since Confederation. 2. Number of divorce bills passed during the same period. 3. Number of applications for divorce bills passed during the present Session. 4. Number of divorce bills passed during the present Session. 5. Whether fees have been remitted in connection with same. 6. If so, in how many cases. Presented June 9, 1919.—*Mr. Lemieux*.. .. .. ..*Not printed.*

285. Return to an Order of the House of the 4th June, 1919, for a Return showing:—1. Amount of goods free of duty, imported by the Dominion Steel Corporation, Limited, into Canada pursuant to contract based on Order in Council, P.C. 758. 2. The nature of these goods. 3. Whether of raw material or manufactured goods. Presented June 9, 1919.—*Mr. Gauthier*.. .. ..*Not printed.*

286. Return to an Order of the House of the 19th May, 1919, for a Return showing:—1. Whether any prizes were taken by the H.M.S. *Niobe* during the war. 2. If so, how many and their estimated value. Presented June 9, 1919.—*Mr. Sinclair*....*Not printed.*

287. Return to an Order of the House of the 28th May, 1919, for a copy of all correspondence, petitions, resolutions and other documents in the possession of the Government relating to the establishment of abattoir and cold storage facilities at Halifax, N.S. Presented by Hon. Mr. Burrell, June 11, 1919.. .. ..*Not printed.*

288. Return to an Order of the House of the 5th June, 1919, for a Return showing:—1. Whether the Government ordered a rebate of 99 per cent off the amount of duty paid on sulphide pulp imported by the Fort Francis Pulp and Paper Company, of Fort Francis, Ontario, in 1918. 2. If so, how much revenue the Government lost in consequence of the said Order. 3. Object of the Order in Council authorizing this Rebate of Customs duty, and at whose request the said Order was passed. 4. How much of such rebate has been applied to reducing the price of newsprint paper to the Western newspaper publishers, and how much the Fort Francis Pulp and Paper Company has been allowed to retain. 5. In view of the fact that auditors, acting on behalf of the Government, have reported that the prices charged for paper by Canadian book paper manufacturers to Canadian publishers are not unreasonable, why the Paper Controller is permitted to make a further drain upon public funds by an additional enquiry into the cost of producing such paper. 6. At whose instigation this new investigation is undertaken. Presented June 11, 1919.—*Mr. Murphy*.. .. ..*Not printed.*

289. Return to an Order of the House of the 1st May, 1919, for a Return showing:—1. The number of persons (not corporations) who paid income tax under clause 4 of the Income War Tax Act, 1917, upon incomes (*a*) exceeding $100,000; (*b*) between $50,000 and $100,000; (*c*) between $30,000 and $50,000; (*d*) between $20,000 and $30,000; (*e*) between $10,000 and $20,000; (*f*) between $6,000 and $10,000 and (*g*) under $6,000. 2. The total sum collected from each of the above categories. Presented June 11, 1919.—*Mr. Ames*.. .. ..*Not printed.*

290. Certified copy of an agreement between His Majesty the King and the Moncton and Buctouche Railway Company, Limited, relating to the purchase of the said railway. Presented by Hon. Mr. Reid, June 12, 1919.. .. ..*Not printed.*

291. Statement of Rents payable by the Department of Public Works throughout the Dominion of Canada, chargeable to "War Appropriation." Presented by Hon. Mr. Carvell, June 12, 1919.. .. ..*Not printed.*

292. Return to an Order of the House of the 26th March, 1919, for a copy of all letters, telegrams, petitions, correspondence, and documents of all kinds in the Post Office Department, referring in any way to charges against the present Postmaster of Brook Village, Inverness County, Nova Scotia, during the last four years. Presented June 12, 1919.—*Mr. Chisholm*.. .. ..*Not printed.*

CONTENTS OF VOLUME 10—*Continued.*

293. Return to an Order of the House of the 5th June, 1919, for a Return showing:—1. Referring to page 381 of the Report of the Ministry Overseas Military Forces of Canada, 1918, and to the Chapter entitled, "Canadian Army Medical Corps." Whether Lieutenant-Colonel Jenkins was named by Sir Edward Kemp and the Sub. Militia Council, or by either of them, under Order No. 31, to investigate and report upon the financial or other dealings of the Canadian Army Medical Service in Europe. 2. Whether the said Lieutenant-Colonel Jenkins made progress reports from time to time. If so, whether such progress reports were sent to Sir Edward Kemp's London Office. 3. Whether the said Jenkins, (*a*) Made a full and final report to Sir Edward Kemp, and (*b*) Whether the said full and final report was received by the Minister in or about the month of November, 1918. 4. If so, after receiving the said final report, whether Sir Edward Kemp had an interview with the said Colonel Jenkins at which a copy of the said report was produced, and after discussion retained by Sir Edward Kemp. 5. Whether the said report disclosed incompetence, neglect, and the wasting of large sums of money in the Canadian Army Medical Service Overseas. 6. Whether the said Order No. 31 and the final report of Colonel Jenkins will be laid on the table of the House. If so, when. 7. Whether there is any objection to the said Order or Report being produced. If so, what the objection is. Presented June 13, 1919.—*Mr. Murphy.* *Not printed.*

294. Report of the Civil Service Commission on the Classification of the Civil Service of the Dominion of Canada, as authorized by the Parliament of Canada. Presented by Hon. Mr. Maclean, June 17, 1919.. .. ..*Printed for distribution.*

294. Report of the Civil Service Commission on the Classification of the Civil Service of the Dominion of Canada, as authorized by the Parliament of Canada.—(French copy). Presented by Hon. Mr. Maclean, June 26, 1919.. .. ..*Printed for disstsribution.*

294*a*. Report of Transmission to accompany the Classification of the Civil Service of Canada, describing the schedules for the classification of positions and the standardization of compensation, etc. Presented by Hon. Mr. Maclean, June 26, 1919. *Printed for distribution.*

295. Return to an Order of the Senate dated May 9, 1919, showing:—Copies of charges and accounts of foundry companies in Nova Scotia against Department of Naval Service for hull repairs and supplies and engine room repairs and supplies H.M.C.S. *Canada,* in fiscal year 1918-19. (*The Senate.*).. .. ..*Not printed.*

296. Return to an Order of the House of the 11th June, 1919, for a Return showing:—1. Amount paid by the Government to the Canadian Car & Foundry Company, Limited, for the use of the Maileable Iron Works, so called, at Amherst, Nova Scotia, as an Internment Camp for alien prisoners. 2. Whether this property is held under lease. If so, when the lease will terminate. 3. Whether there are any outstanding accounts with the above named company against the Government. If so, the nature of these accounts and the respective amounts thereof. Presented June 19, 1919.—*Mr. Copp*.. .. ..*Not printed.*

297. Return to an Order of the House of the 11th June, 1919, for a Return showing:—1. In how many cases the Honourable Albert Sévigny, K.C., of Montreal, was employed to represent the Government or any Department thereof, at Montreal, or any other place in the Province of Quebec, between the 1st of April, 1918, and the 1st of May, 1919. 2. Amount paid by the Government to the said Honourable Albert Sévigny for his services in each case. Presented June 19, 1919.—*Mr. Lanctot*.. .. ..*Not printed.*

298. Copy of Order in Council, P.C. 1127, dated 28th May, 1919, respecting a credit of six million dollars to Italy for the purchase of frozen beef now in storage in Canada. Presented by Hon. Mr. Maclean, June 21, 1919.. .. .. *Not printed*

299. Progress Reports of the Medical Services, Overseas Military Services of Canada, from January 1, 1917, to March 31, 1919. Presented by Hon. Mr. Calder, June 21, 1919. *Not printed.*

300. Return to an Order of the House of the 4th June, 1919, for a Return showing:—1. Referring to page 459 of the Report of the Ministry Overseas Military Forces of Canada, 1918, and to paragraph (*c*) Topical Films; what the total amount paid for the films in question was. 2. Whether such payment was made by or through the Canadian War Records Office in London. If not, by whom such payment was made. 3. To whom such payment was made. 4. Whether the said films, or moving pictures were exhibited in Canada and elsewhere. If so, in what countries. 5. Whether an admission fee was charged at each of such exhibitions. If so, what the total cash proceeds were and to whom the money was paid. 6. Whether the Canadian Government has received the whole, or any part of the said cash proceeds. If not, what action, if any, has been taken to recover the money. 7. Whether the said films were given, sold, leased, or otherwise disposed of to a private company. If so, the terms and

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the names of the members of such company. 8. Whether it is true, as alleged in certain English papers, that the cost of the Canadian War Paintings which were exhibited in England, was defrayed out of the proceeds of the exhibition of the said films, or moving pictures. If so, who had the custody of the funds if they were not turned over to the Government. 9. Whether the Famous Players Film Company had any connection with any of the matters hereinbefore enquired about. If so, what and on what terms. Presented June 21, 1919.—*Mr. Murphy*.. .. .. ..*Not printed.*

301. Return to an Address to His Excellency the Governor General of the 24th April, 1918, for a copy of the correspondence and all papers generally exchanged between the Canadian Government, the Imperial authorities and certain portions of His Majesty's Dominions with a view to give effect to the conclusions of the Dominion Royal Commission. Presented June 23, 1919.—*Mr. Lemieux*.. .. ..*Not printed.*

302. Return to an Order of the House of the 4th June, 1919, for a copy of the report made by Mr. Décarie, local superintendent of the Department of Public Works, relating to the wharf at Cacouna East; also copy of the petition showing the names of the persons who signed requesting the construction of said wharf; also copy of the reports, letters, petitions and requests received from J. A. Tremblay respecting said wharf. Presented June 23, 1919.—*Mr. Gauvreau*.. .. ..*Not printed*

303. Correspondence relating to the resignation of Lieut-Colonel F. McKelvey Bell, M.D., as Director of Medical Services. Presented by Sir Robert Borden, June 24, 1919. *Not printed.*

304. Return to an Order of the House of the 7th April, 1919, for a copy of all correspondence, petitions and other papers concerning the parole or pardon of one Charles McMillan, one Pearson, and one Heaton, sentenced to a certain term of imprisonment in the Alberta Penitentiary. Presented June 26, 1919.—*Mr. Mackie, (Edmonton)*. *Not printed.*

305. Copy of an opinion given by the Minister of Justice *re* Interprovincial traffic in intoxicating liquor, and copy of an opinion given by the Acting Deputy Minister of Justice on the same subject. Presented by Sir Robert Borden, June 27, 1919... .. ..*Not printed.*

306. Third Report of the War Purchasing Commission, covering period from April 1, 1918, to March 31, 1919. Presented by Sir Robert Borden, July 1, 1919.. .. ..*Not printed.*

307. Return to an Order of the House of the 30th April, 1919, for a Return showing the number of conscientious objectors still in jail for contravention of the Military Service Act. Presented July 1, 1919.—*Mr. Lemieux*.. .. ..*Not printed.*

308. Return to an Order of the House of the 23rd June, 1919, for a Return showing:—1. Pensions granted by the Board of Pension Commissioners during the year ending December 31, 1918. 2. Number of pensions refused by said Board during 1918. 3. Whether a member of the Board of Pension Commissioners examined each case before granting or disallowing the same. 4. Whether the granting or disallowing of claims was signed by a member of the said Board, and individually checked by them. 5. Number of complaints regarding pensions made to the said Board of Pension Commissioners during 1918, and during the months of January, February, March and April, 1919. 6. Total expenditure for pensions for the year ending December 31, 1918. 7. Total expense of administering the Pension Act for the year ending December 31, 1918. Presented July 1, 1919.—*Mr. McGibbon*.. .. ..*Not printed.*

309. Return to an Order of the House of the 26th March, 1919, for a copy of all letters, telegrams, petitions, or other documents on file with the Post Office Department received since January 1, 1912, relating to the keeping open or closing of the post office at Sea View, P.E.I. Presented July 1, 1919.—*Mr. Sinclair, (P.E.I.)* .. ..*Not printed.*

310. Return to an Order of the House of the 19th March, 1919, for a Return showing:—The amount, if any, paid by the Government to the Halifax *Chronicle* for printing, advertising, job or other work for each of the following five fiscal years: 1914, 1915, 1916, 1917, 1918. Presented July 1, 1919.—*Mr. Proulx*.. .. ..*Not printed.*

311. Return to an Order of the House of the 11th June, 1919, for a Return showing:—1. Rentals paid by the Government during the years 1914, 1915, 1916, 1917, 1918 and 1919, to Mr. Huntley Drummond, of Montreal, for the lease of the Drummond Building. 2. Departments of the Government which were, and are located in the said building. Presented July 1, 1919.—*Mr. Brouillard*.. .. ..*Not printed.*

312. Return to an Order of the House of the 5th May, 1919, for a Return showing:—1. What rental per month the Government pays for all branches of Government service in the City of Edmonton. 2. What several branches of Government service are represented in Edmonton. 3. What building or buildings they occupy, and the monthly rental of each branch of the service. Presented July 1, 1919.—*Mr. Douglas, (Strathcona)*. *Not printed.*

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313. Return to an Order of the House of the 8th May, 1919, for a copy of all letters, telegrams and other papers regarding the supplies purchased for Yukon Telegraph Lines during the fiscal year 1918-1919, including copy of all tenders, the names of the tenderers and the amount of each tender. Presented July 2, 1919.—*Mr. Lemieux... Not printed.*

314. Return to an Order of the House of the 23rd April, 1919, for a copy of all letters, telegrams, memoranda, contracts, reports, despatches, recommendations, agreements made, received, sent or entered into by any of the Departments of the Government, and any persons, companies or corporations with reference to, or resulting from the construction of the dam across the St. Maurice river at the place called Grand'Mère. Presented July 4, 1919.—*Mr. Desaulniers.. .. ..Not printed.*

315. Return to an Order of the House of the 23rd April, 1919, for a copy of all reports, recommendations, letters, memoranda, messages and estimates having reference to the construction of the piers used to anchor the booms which hold the logs that are floated on the St. Maurice river at Ste. Flore Station or above the Grand'Mère dam. Presented July 4, 1919.—*Mr. Desaulniers.. .. ..Not printed.*

316. Return to an Order of the House of the 25th June, 1919, for a Return showing:—1. When the War Bonus was distributed to the Inside Civil Service. 2. What Departments received said bonus. 3. Whether the same amounts were distributed to every Civil Servant in each Department. 4. Whether a bonus was distributed to the Civil Servants in the Soldiers' Civil Re-Establishment Department, and in the Department of the Board of Pensions Commissioners. 5. Whether any bonuses were distributed to the Civil Servants in the Department of the Canada Food Board. If so, when. If not, why. 6. Whether a Civil Servant who was employed in the Militia Department at the time the first Order in Council was passed granting bonuses, is entitled to said Bonus, although said Civil Servant has been transferred to another Department since. 7. Whether it is the intention of the Government to grant Bonuses this year. Presented July 4, 1919.—*Mr. Archambault.. .. ..Not printed.*

317. Return to an Order of the House of the 8th May, 1919, for a Return showing the amounts paid for advertising, printing, etc., by the various Departments of the Government during the fiscal years 1916, 1917, 1918 to the following newspapers: The Brantford *Expositor,* The Woodstock *Sentinel Review,* The Stratford *Beacon,* The Kingston *Whig,* The Hamilton *Times,* The Toronto *Globe,* The Toronto *Star,* the Guelph *Mercury,* The Niagara Falls *Review,* The St. Catharines *Journal,* The Ingersoll *Chronicle,* The Orillia *Times,* The Belleville *Ontario,* The Simcoe *Reformer,* The Richmond Hill *Liberal,* The Acton *Free Press,* The Mitchell *Recorder,* and the Owen Sound *Sun.* Presented July 4, 1919.—*Mr. Lemieux.. .. ..Not printed.*

318. Report of the Administrative Chairman of the Honourary Advisory Council for Scientific and Industrial Research of Canada, for the year ending March 31, 1919. Presented by Hon. Mr. Burrell, July 4, 1919.. .. ..*Not printed.*

319. Return to an Order of the House of the 23rd June, 1919, for a copy of all reports, Orders in Council, and all other papers in connection with the Halifax Relief Commission, including a statement of all receipts and expenditures in this connection up to May 31, 1919. Presented July 4, 1919.—*Mr. Duff.. .. ..Not printed.*

320. Return to an Order of the House of the 19th May, 1919, for a copy of all correspondence, memoranda, reports, plans and estimates relating to the construction of the retaining wall, along the shore of the St. Lawrence River, opposite the village of St. François-Xavier de Batiscan, in the County of Champlain. Presented July 5, 1919.—*Mr. Desaulniers.. .. ..Not printed.*

321. Return to an Order of the House of the 9th June, 1919, for a copy of all documents, telegrams and correspondence between the Federal Department of Agriculture and the Department of Agriculture of Prince Edward Island, or any person or persons in the Maritime Provinces, relating in any way to the Maritime Seed Fair, held in Summerside, Prince Edward Island, in 1918. Presented July 5, 1919.—*Mr. Sinclair, (P.E.I.) Not printed.*

322. Return to an Order of the House of the 3th June, 1919, for a Return showing for each year from July 1, 1867, the amount received into the Dominion Treasury as (*a*) Customs duties; (*b*) Excise duties; (*c*) Custom and Excise duties together; also amount paid to the Governments of the Provinces as (*a*) allowances for support of governments and legislatures; (*b*) annual grants of subsidy to the said Governments; (*c*) allowances and subsidy together, and the proportion which such payments bore to the receipts from Custom and Excise. Presented July 5, 1919.—*Mr. Fielding.. .. ..Not printed.*

323. Ordinances of the Yukon. Presented by Hon. Mr. Rowell, July 5, 1919... ..*Not printed.*

REPORTS, RETURNS AND STATISTICS

OF THE

INLAND REVENUES

OF THE

DOMINION OF CANADA

For the Fiscal Year ended March 31

1918

PART I—EXCISE

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1918

[No. 12—1919.]

To His Excellency the Duke of Devonshire, K.G., P.C., G.C.M.G., G.C.V.O., etc., etc., Governor General and Commander in Chief of the Dominion of Canada.

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to transmit to Your Excellency the RETURNS AND STATISTICS of Inland Revenue of the Dominion of Canada, for the year ended March 31, 1918, as prepared and laid before me by the Asst. Deputy Minister of Inland Revenue.

All of which is respectfully submitted.

ARTHUR L. SIFTON,
Minister of Customs and Inland Revenue.

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REPORT

OF THE

ASSISTANT DEPUTY MINISTER OF INLAND REVENUE

To the Hon. A. L. Sifton,
Minister of Customs and Inland Revenue.

Sir,—Herewith I have the honour to submit statements of the Inland Revenues collected by this department during the fiscal year ended March 31, 1918, with the usual information as to the cost of collections, and statistics respecting the sources whence these revenues were derived.

The following summary comparison shows the accrued revenues for the fiscal years ended March 31, 1914, 1915, 1916, 1917, and 1918.

——	1914.	1915.	1916.	1917.	1918.
	$	$	$	$	$
Excise	21,488,867	21,627,958	22,540,406	24,525,361	27,011,282
Ferry Licenses	964	989	989	989	2,013
Weights and Measures, Gas and Law Stamps	185,854	172,740	169,454	194,417	204,955
Electric Light	80,476	82,565	70,562	71,116	79,520
Other Revenues	5,523	103,[illegible]	8,490	9,885	12,206
War Tax	.....	.....	1,550,488	2,072,441	2,253,422
Methylated Spirits	116,208	96,747	111,846	183,708	398,968
Total	21,877,892	22,084,931	24,452,235	27,057,917	29,962,366

Details of Excise Revenue accrued during the undermentioned fiscal years:—

—	1914.	1915.	1916.	1917.	1918.
	$	$	$	$	$
Spirits	9,038,028	8,706,481	8,701,075	9,880,567	11,486,527
Malt liquor	161,416	142,903	97,779	109,215	80,486
Malt	2,012,301	2,616,288	2,689,300	2,367,902	1,791,482
Tobacco	9,489,426	9,352,881	10,222,784	11,197,103	12,616,879
Cigars	588,935	655,905	635,158	730,215	776,086
Acetic Acid	11,413	7,255	8,250	8,049	7,330
Manufactures in bond	92,160	94,904	105,812	110,409	123,183
Seizures	1,434	4,141	10,349	8,353	6,933
Other receipts	93,753	77,200	42,538	113,548	122,376
Totals	21,488,866	21,657,958	22,513,045	24,525,361	27,011,282

The quantity of Spirits produced during the fiscal year was 3,566,955 proof gallons, as compared with 6,400,119 proof gallons produced in the previous fiscal year. The raw materials taken for use, in the production of Spirits, during the fiscal year were as follows:—

	Lb.
Malt	5,292,991
Indian corn	35,633,568
Rye	7,027,450
Oats	124,460
Molasses	18,171,440

The transactions of the several distilleries will be found stated in detail in Appendix A (Statement No. 1 A), pages 42 and 43.

	Proof galls.
There was, on April 1, 1917, in process of manufacture	260,926
Manufactured during the fiscal year	3,566,955
Returned to distilleries for redistillation—In bond	160,179
Received into distilleries from other sources—Duty paid	8,806
Received into distilleries from other sources—In bond	74
Total	3,996,940

This was disposed of as follows:—

	Proof galls.
Placed in warehouse	3,556,707
Fusel oil written off	18,109
Deficiency arising from rectification	2,440
Remaining in process of manufacture, March 31, 1918, by actual stock taking	419,684
Total	3,996,940

Spirits.—The following statement shows the warehousing transactions in Spirits during the fiscal year ended March 31, 1918, and the four preceding fiscal years:—

Fiscal Years.	In Warehouse at beginning of year, including transits.	Warehoused during the year, Ex-distillery.	Otherwise warehoused.	Taken for consumption.	Exported.	Used in bonded factories.	Otherwise accounted for.	For redistillation.	In Warehouse at end of year, including transits.
	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.
1913–1914	20,668,160	7,488,904	66,510	4,762,618	335,970	451,567	545,437	566,006	21,561,976
1914–1915	21,561,976	6,490,682	45,918	4,021,090	275,911	474,033	459,038	369,168	22,499,336
1915–1916	22,499,336	3,941,105	88,346	3,629,324	808,135	1,160,360	388,160	443,690	20,099,118
1916–1917	20,099,118	6,778,415	841,869	4,118,147	1,289,117	4,273,682	603,058	265,156	17,170,242
Totals	84,828,590	24,699,106	1,042,643	16,531,179	2,709,133	6,359,642	1,995,693	1,644,020	81,330,672
Average	21,207,148	6,174,776	260,661	4,132,795	677,283	1,589,910	498,923	411,005	20,332,668
1917–1918	17,170,242	3,556,707	3,103,403	4,793,297	587,409	4,571,348	670,896	160,179	13,047,223

The foreign demand for Canadian distillery products is less than the average of the last four years, the quantities exported being as follows:—

	Proof galls.
1913–1914	335,970
1914–1915	275,911
1915–1916	808,135
1916–1917	1,289,117
1917–1918	587,409

The following statement shows the entire quantities of Spirits upon which duties were collected during the several fiscal years recited therein. To accord with the figures shown in Financial Statement No. 8, pages 24 and 25:—

Fiscal Years.	Canadian Spirits.		Imported Spirits used in Bonded Factories.	Total quantities upon which duty was collected.	Revenue accrued, including License Fees.
	Paid duty Ex-distillery.	Paid duty Ex-warehouse.			
	Pf. Gallons.	Pf. Gallons.	Pf. Gallons.	Pf. Gallons.	$
1913–1914	2,001	4,762,618	66,497	4,831,116	9,038,028
1914–1915	6,407	4,021,090	44,690	4,072,187	8,702,981
1915–1916	4,066	3,629,324	85,954	3,719,344	8,701,075
1916–1917	3,080	4,118,147	125,140	4,246,367	9,880,567
Totals	15,554	16,531,179	322,281	16,869,014	36,322,651
Average	3,888	4,132,795	80,570	4,217,254	9,080,663
1917–1918	2,413	4,591,972	201,326	4,795,711	11,486,527

Malt.—The following statement shows the transactions in Malt during the fiscal year ended March 31, 1918, and the four preceding fiscal years:—

Fiscal Years.	In Warehouse at beginning of year, including transits.	Manufactured during the year.	Imported.	Increases.	Taken for consumption.	Exported.	Otherwise accounted for.	In Warehouse at end of year, including transits.	Revenue accrued, including License Fees.
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	$
1913-1914	34,262,234	133,740,168	10,263,724	736,800	133,794,639	161,820	4,894,662	40,151,805	2,012,301
1914-1915	40,151,805	119,917,181	3,363,587	713,406	111,037,743	228,180	3,453,416	49,426,640	2,616,288
1915-1916	49,426,640	74,053,211	1,379,490	829,448	89,476,590	2,501,130	3,801,448	29,909,621	2,689,300
1916-1917	29,909,621	78,771,388	766,669	295,874	78,815,746	3,888,352	4,865,152	22,172,062	2,367,902
Totals	153,750,300	406,481,948	15,773,470	2,575,528	413,124,718	6,779,482	17,014,678	141,660,128	9,685,791
Average	38,437,575	101,620,487	3,943,367	643,882	103,281,179	1,694,870	4,253,669	35,415,032	2,421,448
1917-1918	22,172,062	67,134,788	1,207,526	578,449	59,626,049	5,352,966	4,279,978	21,833,832	1,791,482

Tobacco.—The following statement shows the transactions in Tobacco, Cigarettes, and Snuff during the fiscal year ended March 31, 1918, and the four preceding fiscal years:—

Fiscal Years.	In Warehouse at beginning of year, including transits.	Manufactured during the year.	Taken for consumption.	Exported.	Otherwise accounted for.	In Warehouse at end of year, including transits.	Raw Leaf taken for consumption.	Canada Twist taken for consumption.	Total Tobacco taken for consumption.	Other Materials taken for consumption.	Revenue accrued, including License Fees.
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	$
1913-1914	1,103,765	25,485,348	25,735,773	3,358	3,916	846,066	18,775,803	11,057	44,522,633	1,510,010	9,489,426
1914-1915	846,065	24,216,866	24,444,380	10,094	44,764	563,694	15,723,329	6,855	40,174,564	1,280,589	9,352,881
1915-1916	563,694	25,390,672	23,937,785	723,532	380,055	912,994	16,571,311	7,430	40,516,526	1,365,175	10,222,784
1916-1917	912,994	25,980,442	24,651,225	922,033	670,804	625,847	17,470,422	5,685	42,127,332	1,548,809	11,197,103
Totals	3,426,518	101,073,328	98,769,163	1,659,017	1,099,539	2,948,601	68,540,865	31,027	167,341,055	5,704,583	40,262,194
Average	856,629	25,268,332	24,692,291	414,754	274,885	737,150	17,135,216	7,757	41,835,264	1,426,146	10,065,548
1917-1918	625,847	29,168,292	26,768,074	2,032,770	307,975	685,320	18,146,814	4,492	44,920,380	1,752,476	12,616,879

Cigars.—The following statement shows the transactions in Cigars during the fiscal year ended March 31, 1918, and the four preceding fiscal years:—

Fiscal Years.	In Warehouse at beginning of year, including transits.	Manufactured during the year.	Assessments to bring production up to Standard.	Taken for Consumption.	Exported.	Otherwise accounted for.	In Warehouse at end of year, including transits.	Revenue accrued, including License Fees.
	No.	No.	No.	No.	No.	No.	No.	$
1913–1914	25,281,222	291,359,173	349,188	288,219,892	7,525	.....	28,762,166	588,935
1914–1915	28,762,166	226,147,875	1,304,626	236,866,542	16,100	30,000	19,302,025	625,905
1915–1916	19,302,025	209,628,956	207,672	207,647,808	11,225	624,925	20,854,795	635,158
1916–1917	20,854,795	237,647,769	658,938	239,752,252	21,975	2,127,395	17,258,880	730,215
Totals	94,200,208	964,783,773	2,520,424	972,486,494	56,825	2,782,320	86,177,866	2,580,213
Average	23,550,052	241,195,943	630,106	243,121,624	14,206	695,580	21,544,466	645,053
1917–1918	17,258,880	253,824,568	1,177,837	254,445,945	875,690	802,505	16,137,145	45 776,086

The revenues derived from goods manufactured in bond during the fiscal year ended March 31, 1918, and the four preceding fiscal years, were as follows:—

1913–1914	$ 92,160
1914–1915	94,904
1915–1916	105,812
1916–1917	110,409
1917–1918	123,183

Acetic Acid.—The revenues derived from Acetic Acid during the fiscal year ended March 31, 1918, and the four preceding fiscal years, were as follows:—

1913–1914	$ 11,413
1914–1915	7,255
1915–1916	8,250
1916–1917	8,049
1917–1918	7,330

Inspection of Petroleum.—The quantity of Petroleum and Naphtha inspected during the fiscal year was as follows:—

	Galls.
Petroleum	41,098,044
Naphtha	60,002,459
Total	101,100,503

Methylated Spirits.—The quantity of Methylated Spirits manufactured during the fiscal year was 454,154.28 proof gallons, and the sales 447,279.92 proof gallons. A statement of details appears on pages 36 and 37.

The price of this denatured alcohol is practically the actual cost of manufacture, and has been following varying prices on account of the constantly increasing cost of alcohol and naphtha:—

On and after the 27th April, 1917, the prices of methylated spirits have been as follows:—

Grade No. 1 "Standard" and grade No. 1 "Benzine" when consigned to points East of Winnipeg, or West of, and including Quebec, $1.25 per Imperial gallon; when consigned to points beyond Quebec and Winnipeg, the latter inclusive, $1.23 per Imperial gallon.

Grade No. 2 "Standard" $1.25 per Imperial gallon.

On and after the 13th November, 1917, the prices of methylated spirits have been as follows:—

Grade No. 1 "Standard" and grade No. 1 "Benzine" when consigned to points East of Winnipeg, or West of, and including Quebec, $1.50 per Imperial gallon; when consigned to points beyond Quebec and Winnipeg, the latter inclusive, $1.48 per Imperial gallon.

Grade No. 2 "Standard" $1.50 per Imperial gallon.

APPENDIX A shows the consumption of, and revenues derived annually, from spirits, tobacco, and other goods subject to Excise, and of similar goods subject to duties of Customs, per head of the population of the Dominion.

APPENDIX B contains, as usual, the details concerning illicit stills seized during the year.

APPENDIX C shows the amount of Excise Revenues collected at each out office, and under various headings, separately.

I have the honour to be, Sir,
Your obedient servant,

GEO. W. TAYLOR,
Asst. Deputy Minister

INLAND REVENUE DEPARTMENT,
OTTAWA, July 2, 1918.

APPENDIX A.

TABLE showing the Annual Consumption, per head, of the undermentioned articles, paying Excise and Customs Duties, and Revenue, per head, derived annually.

Years.	Dominion of Canada.							
	Quantity.				Duty.			
	Spirits.	Beer.	Wines.	Tobacco.	Spirits.	Beer.	Wines.	Tobacco.
	Galls.	Galls.	Galls.	Lb.	$	$	$	$
1869	1·124	2·290	·115	1·755	·761	·092	·037	·193
1870	1·434	2·163	·195	2·190	·962	·085	·049	·259
1871	1·578	2·490	·259	2·052	1·059	·095	·056	·336
1872	1·723	2·774	·257	2·481	1·160	·108	·070	·422
1873	1·682	3·188	·238	1·999	1·135	·120	·066	·350
1874	1·994	3·012	·288	2·566	1·363	·119	·086	·442
1875	1·394	3·091	·149	1·995	1·127	·114	·069	·428
1876	1·204	2·454	·177	2·316	1·182	·098	·075	·513
1877	·975	2·322	·096	2·051	·949	·109	·057	·446
1878	·960	2·169	·096	1·976	·927	·147	·052	·439
1879	1·131	2·209	·104	1·954	1·005	·125	·057	·449
1880	·715	2·248	·077	1·036	·772	·081	·055	·428
1881	·922	2·293	·099	2·935	·990	·081	·073	·443
1882	1·009	2·747	·120	2·150	1·084	·098	·092	·485
1883	1·090	2·882	·135	2·280	1·186	·103	·097	·473
1884	·988	2·924	·117	2·476	1·074	·104	·082	·365
1885	1·126	2·639	·109	2·623	1·198	·111	·074	·393
1886	·711	2·839	·110	2·052	1·007	·091	·074	·502
1887	·746	3·084	·095	2·062	1·045	·100	·066	·514
1888	·645	3·247	·094	2·093	·944	·110	·066	·509
1889	·776	3·263	·097	1·953	1·107	·114	·068	·529
1890	·883	3·360	·104	2·043	1·257	·121	·072	·539
1891	·745	3·790	·111	2·292	1·094	·137	·080	·590
1892	·701	3·516	·101	2·291	1·156	·211	·075	·680
1893	·740	3·485	·094	2·314	1·235	·218	·070	·691
1894	·742	3·722	·089	2·264	1·235	·205	·060	·683
1895	·666	3·471	·090	2·163	1·124	·161	·056	·645
1896	·623	3·528	·070	2·120	1·159	·164	·047	·639
1897	·723	3·469	·084	2·248	1·341	·213	·041	·671
1898	·536	3·808	·082	2·358	1·306	·126	·041	·615
1899	·661	3·995	·086	2·174	1·367	·174	·045	·841
1900	·701	4·364	·085	2·300	1·455	·185	·044	·853
1901	·757	4·680	·099	2·375	1·574	·195	·047	·864
1902	·786	5·035	·090	2·371	1·631	·211	·048	·902
1903	·848	4·592	·094	2·483	1·766	·200	·049	·967
1904	·917	4·739	·092	2·664	1·913	·217	·049	1·005
1905	·895	5·123	·093	2·768	1·898	·214	·049	1·036
1906	·898	5·484	·095	2·898	1·879	·238	·052	1·100
*1907 (nine months)	·977	5·765	·095	3·048	2·035	·257	·054	1·317
1908	·939	6·146	·102	3·066	1·965	·268	·057	1·194
1909	·860	5·708	·091	3·105	1·794	·241	·050	1·101
1910	·883	5·713	·105	3·183	1·843	·242	·057	1·059
1911	·948	5·999	·114	3·323	1·988	·257	·059	1·157
1912	1·030	6·598	·114	3·679	2·170	·288	·063	1·336
1913	1·112	7·005	·131	3·818	2·340	·320	·076	1·462
1914	1·061	7·200	·124	3·711	2·249	·328	·069	1·438
1915	·872	6·071	·095	3·427	2·086	·379	·051	1·361
1916	·745	4·950	·062	3·329	1·951	·362	·033	1·454
1917	·698	4·188	·061	3·330	1·788	·304	·033	1·520
1918	·699	3·414	·061	3·612	1·810	·228	·036	1·698
Average	·952	3·905	·115	2·501	1·409	·177	·060	·767

APPENDIX B.

STATEMENT of Seizures of Illicit Manufactures for the year ended March 31, 1918.

Divisions.	Number.	Date.	Names.	Residence.	Schedule Value.	Remarks.
					$ cts.	
Montreal	1412	Sept. 25	Boyer & Lanctot	Montreal	20 00	Fine $100, imposed and paid.
Montreal	1425	Nov. 13	L. Charbonneau	Montreal	5 00	Fine $100, imposed and paid.
Montreal	1432	Dec. 3	Kelly, Kelly & al	Montreal	80 50	Fine $1,000, imposed and paid.
Montreal	1433	Dec. 8	B. Lipson	Montreal	240 50	Pending.
Montreal	1438	Dec. 18	G. & R. Denis	Montreal	5 50	Fine $200, imposed and paid.
Montreal	1463	Jan. 18	P. Ledoux	Montreal	2 00	Pending.
Montreal	1471	Mar. 18	P. Routhier & A. Rozone	Montreal	15 00	Pending.
Quebec	675	Sept. 18	J. Ouellet	St. Roch des Aulnaies	10 00	Fine $100, imposed and paid.
St. Hyacinthe	G. 5950	Jan. 9	M. Bermans	La Tuque	.....	Fine $50, imposed and paid.
St. Hyacinthe	151	Jan. 21	A. Lafontaine	La Croche	32 25	Pending.
Sherbrooke	222	Oct. 10	A. Champigny	F. Melbourne	6 00	Fine $150, imposed and paid.
Pictou	124	Aug. 15	D. V. Mansini	North Sydney	3 68	Fine $100, imposed and paid.
Moosejaw	7	Jan. 7	D. Vasich	S.E. ¼ 23 S.2 West	20 00	Fine $200, imposed and paid.

APPENDIX C.

STATEMENT showing the Amount of Excise and other Revenue collected at each of the undermentioned Out-Offices during the year ended March 31, 1918.

Divisions.	Out-Offices.	Licenses.	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Manufactures in Bond.	Other Receipts.	War Tax.	Totals.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Belleville	Deseronto									198 65	198 65
	Marmora									70 59	70 59
	Picton									887 85	887 85
	Trenton									50 00	50 00
Brantford	Delhi									2,078 88	2,078 88
	Ingersoll										
	Norwich	50 00						2,299 19	739 26	705 50	3,793 95
	Paris									927 90	927 90
	Port Dover									265 28	265 28
	Port Rowan									290 00	290 00
	Simcoe								981 22	1,601 21	2,582 43
	St. George									325 60	325 60
	Tillsonburg									1,414 94	1,414 94
	Tavistock										
	Waterford										
	Woodstock	50 00				112 00	123 60		2,542 14	3,087 42	5,915 16
Guelph	Galt	125 00			1,512 63				710 40	2,816 55	5,164 58
	Kitchener	225 00			15,297 00	928 48	1,554 75		6,091 44	4,388 69	28,485 36
	New Hamburg	50 00			882 03						932 03
	Preston	50 00			745 41				2,159 17	1,420 65	4,375 23
	Waterloo	550 00	224,158 00		65,766 51	339,22	1,275 00		11,568 30	1,620 20	305,277 23
Hamilton	Dundas									395 00	395 00
Kingston	Napanee								537 52	1,084 97	1,622 49
London	Aylmer									729 93	729 93
	Glencoe									434 10	434 10
	Petrolia	2 00							0 10	1,004 44	1,006 54
	Sarnia	76 00				63 00	78 14		149 94	4,326 12	4,693 20
	St. Thomas	150 00				2,578 84	1,713 00		178 25	4,935 20	9,555 29
	Strathroy								818 61	779 30	1,597 91
Ottawa	Buckingham	50 00	1,034 17							222 47	1,306 64
	Ville-Marie										
Owen Sound	Collingwood										
	Kincardine										
	Meaford										

APPENDIX C—*Continued.*

STATEMENT showing the Amount of Excise and other Revenue collected at each of the undermentioned Out-Offices during the year ended March 31, 1918.

Divisions.	Out-Offices.	Licenses.	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Manufactures in Bond.	Other Receipts.	War Tax.	Totals.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Owen Sound	Neustadt	50 00			1,206 00					31 00	1,287 00
	Walkerton	50 00			2,067 00				1,379 76	1,288 41	4,785 17
	Wiarton										
Perth	Arnprior									4,290 56	4,290 56
	Eganville									87 70	87 70
	Cobalt									1,668 62	1,668 62
	Haileybury										
	Mattawa									54 45	54 45
	New Liskeard								335 60	1,320 15	1,655 75
	North Bay	25 00								994 08	1,019 08
	North Cobalt										
	Pembroke										
	Renfrew	825 00						28 12	1,618 00	338 90	2,810 02
	Sturgeon Falls									219 80	219 80
	Sudbury	50 00			43,200 00					2,983 24	46,233 24
Peterborough	Cobourg								1 60	1,756 20	1,757 80
	Lindsay										
	Port Hope	25 00							0 80	4,507 68	4,533 48
Port Arthur	Dryden	75 00	59,320 31							1,019 50	60,414 81
	Fort Frances									1,053 90	1,053 90
	Fort William	100 00	17,301 01		8,100 00					1,938 24	27,439 25
	Kenora										
	Rainy River	100 00	3,828 61							423 93	4,352 54
	Wabigoon										
Prescott	Brockville	100 00				520 52	818 40		486 84	2,012 51	3,938 27
	Cornwall	50 00			7,110 00				896 17	1,524 52	9,580 69
St. Catharines	Beamsville										
	Bridgeburg								8,086 62	50 00	8,136 62
	Cayuga									89 10	89 10
	Crystal Beach										
	Dunnville										
	Fort Erie										
	Grimsby										
	Humberstone	50 00				36 12	167 25			79 20	332 57

	Merritton										
	Niagara Falls	75 00				228 20	504 30		2,442 37	12,447 60	15,697 47
	Niagara-on-the-Lake										
	Port Colborne	50 00			4,773 60					1,148 40	5,972 00
	Port Dalhousie									30 00	30 00
	Queenstown										
	Ridgeway									251 46	251 46
	Thorold									637 30	637 30
	Welland	50 00				203 84	385 50			534 60	1,173 94
	Stamford									4,298 00	4,298 00
	Font Hill									561 13	561 13
Stratford	Clinton									310 60	310 60
	Goderich	50 00	364 33						30 00		444 33
	Listowell	100 00				1,215 20	1,389 30			865 04	3,569 54
	Mitchell									2 50	2 50
	Palmerston										
	St. Mary's									1,215 20	1,215 20
	Seaforth									667 05	667 05
	Migham									725 00	725 00
Toronto	Barrie	25 00								3,738 06	3,763 06
	Collingwood	50 00								1,701 23	1,751 23
	Hornby										
	Orillia										
	Parry Sound	800 00									800 00
	Sault Ste. Marie	250 00			12,000 00	1,307 04	989 40			4,059 00	18,605 44
	Whitby										
Windsor	Chatham	150 00				1,612 62	746 03			8,033 53	10,542 18
	Kingsville	50 00				471 75					521 75
	Leamington	475 00	123 19			2,115 08	90 00	6,197 38	607 50	968 96	10,577 11
	Wallaceburg									1,762 95	1,762 95
Joliette	Berthierville	250 00	29,684 89		1,546 23				29,129 50	226 25	60,836 87
	L'Epiphanie	250 00				2,919 76	12,842 16			57 00	16,138 92
	Rawdon										
	St. Alexis	50 00				632 50					682 50
	St. Esprit									41 90	41 90
	St. Felix									39 25	39 25
	St. Jacques										
	Ste. Elizabeth										
	St. Lin	100 00				4,766 84	1,679 10			46 54	6,592 48
	St. Roch	50 00				1,125 00				5 00	1,180 00
Montreal	Chambly Basin										
	Lachine										
	St. Jerome	100 00	19,423 25							666 70	20,189 95
	St. Laurent										
	Ste. Therese										
	Valleyfield	50 00	17,790 09							2,187 67	20,027 76
Quebec	Chicoutimi										
	Fraserville										
	Gaspe	50 00	4,023 85							142 00	4,215 85
	Levis	50 00				8,422 68	13,623 66		0 90	379 13	22,476 37
	Roberval										

APPENDIX C—*Continued.*

STATEMENT showing the Amount of Excise and other Revenue collected at each of the undermentioned Out-Offices during the year ended March 31, 1918.

Divisions.	Out-Offices.	Licenses.	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Manufactures in Bond.	Other Receipts.	War Tax.	Totals.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
St. Hyacinthe	Farnham										
	L'Ange Gardien										
	St. Cesaire										
	St. John	200 00	10,940 27			737 76	54 15			696 90	12,629 08
	St. Ours										
	Sorel									3,985 07	3,985 07
	Victoriaville	100 00	3,159 42						793 20	829 50	4,882 12
Sherbrooke	Granby	350 00				660,391 04	9,085 27		518 18	1,221 95	671,566 44
Three Rivers	Andover										
	Charette Mill	50 00				282 30					332 30
	Grand' Mere									220 10	220 10
	La Tuque										
	Louiseville									174 43	174 43
	Notre Dame de Charette										
	Shawinigan Falls	50 00				44 24	330 00				424 24
	St. Boniface	50 00				19,710 00				23 75	19,783 75
	St. Tite										
St- John	Bathurst										
	Campbellton										
	Campobello										
	Chatham										
	Clair										
	Dalhousie										
	Edmundston									50 25	50 25
	Fredericton										
	Grand Falls										
	Moncton										
	Newcastle										
	Shediac										
	Sackville										
	St. Stephens								50 16	796 57	846 73
	St. Andrews										
	Sussex										

	Woodstock										
Halifax	Amherst								679 59	1,909 00	2,588 59
	Lunenburg									43 48	43 48
	Parrsborough									169 00	169 00
	Truro	100 00				3,746 30			0 40	1,591 30	5,438 00
	Weymouth									293 03	293 03
	Windsor									446 19	446 19
	Yarmouth	50 00				42 00	203 55			687 60	983 15
Pictou	Antigonish									352 86	352 86
	New Glasgow								71 69	2,480 20	2,551 89
	North Sydney	100 00	1,048 55							562 20	1,710 75
	Sydney	450 00	37,144 89				631 06			1,794 35	40,020 30
Charlottetown	Georgetown										
	Souris										
	Summerside										
	Alberton										
	Cardigan										
	Crapaud										
	Murray Harbour										
	Montague										
	St. Peters										
	Tignish										
Winnipeg	Brandon	400 00	45,908 62	52 50	9,820 80	688 80	646 70		1 33	4,333 10	61,851 85
	Beausejour										
	Dauphin	50 00	2,346 47							2,098 35	4,494 82
	Emerson										
	Gretna									61 55	61 55
	Morden									49 38	49 38
	Portage la Prairie									626 75	626 75
	Selkirk										
	Transcona										
	Virden	100 00	55,233 26							1,627 06	56,960 32
	York Factory										
	Kenora	400 00	469,141 14							5,644 04	475,185 18
Calgary	Blairmore										
	Camrose										
	Edmonton	300 00	4,559 47		8,516 64	6,047 16	3,784 80	1,045 38	600 00	14,748 26	39,601 71
	Fort Saskatchewan										
	High River										
	Lacombe										
	Lethbridge	50 00			12,000 00					3,738 54	15,788 54
	Medicine Hat	50 00			2,100 00					1,655 35	3,805 35
	Pincher Creek										
	Red Deer										
	Stettler	50 00				1,715 56	681 15			430 55	2,877 26
	Strathcona										
	Taber										
	Vermilion										
	Wetaskiwin										
Moosejaw	Estevan										
	Gull Lake										

APPENDIX C—*Concluded.*

STATEMENT showing the Amount of Excise and other Revenue collected at each of the undermentioned Out-Offices during the year ended March 31, 1918.

Divisions.	Out-Offices.	Licenses.	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Manufactures in Bond.	Other Receipts.	War Tax.	Total.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Moosejaw	Maple Creek									581 97	581 97
	Melville										
	North Battleford									450 54	450 54
	Prince Albert	50 00			879 15					1,602 66	2,531 81
	Regina	501 00	12 086 63		420 00	85 96	31 95		12 34	14,000 99	27,138 87
	Rosthern										
	Saskatoon	300 00	23,646 48		9 000 00					15,122 48	48,068 95
	Swift Current										
	Weyburn										
Vancouver	Anaconda										
	Cranbrook	150 00	36,753 94		1,050 00				39 08	535 90	38,528 92
	Fernie	200 00	32,645 07		9,440 00	122 36	129 45			722 60	43,263 48
	Fort George										
	Golden	50 00	10,207 08							281 86	10,538 94
	Grand Forks	100 00			360 00					456 80	916 80
	Greenwood										
	Kamloops	200 00	2,548 65		1,572 30	976 92	467 80			1,621 82	7,387 49
	Kelowna										
	Merritt	50 00			509 40					154 00	713 40
	Michel	100 00	30,160 62		2,910 00						33,170 62
	Moyie City										
	Nelson	200 00	16,675 49		4,639 95	383 14	259 50		53 56	1,404 52	23,616 16
	New Westminster	300 00	4,113 77	3,289 50	6,600 00	3,477 88	1,659 36			2,273 30	21,713 81
	Phoenix	50 00			2,651 01					91 23	2,792 24
	Prince Rupert	150 00	4,528 92			141 40	68 30			1,581 04	6,469 66
	Princetown	50 00			924 99					329 20	1,304 19
	Revelstoke	150 00	10,722 11		1,584 00	33 88	51 00			901 55	13,442 54
	Rossland	150 00	2,173 98		1,053 60	471 28	179 70			427 00	4,455 56
	Trail	100 00			6,000 00					906 95	7,006 95
	Vernon	100 00	4,589 48		579 30					1,745 94	7,014 72
Victoria	Cumberland	50 00								655 85	705 85
	Ladysmith	50 00				317 52	153 30			302 21	823 03
	Nanaimo	300 00	5,922 43		6,000 00	1,255 52	696 08			1,584 50	15,758 53
	Sidney										
Dawson	Yukon										
Total		12,204 00	1,203,308 44	3,342 00	252,821 55	730,339 71	57,092 71	9,570 07	74,312 54	212,617 74	2,555,608 76

FINANCIAL STATEMENTS, 1917-1918.

DR. No. 1.—GENERAL REVENUES Account for the year ended March 31, 1918. CR.

Memo. of Refunds deducted below.	Amounts deposited to the Credit of the Receiver General.	Balance due March 31, 1918.		Services.	Revenues of previous year, April 1, 1917.	Revenues 1917-1918.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
239,406 92	27,011,527 30	21,251 55	27,032,778 85	Excise and Seizures, per Statement No. 3	21,497 24	27,011,281 61	27,032,778 85
58 80	141,389 40	161 22	141,550 62	Weights and Measures, per Statement No. 13	252 12	141,298 50	141,550 62
.....	56,319 05	.....	56,319 05	Gas Inspection, per Statement No. 14	.....	56,319 05	56,319 05
.....	80,123 60	.....	80,123 60	Electric Light Inspection, per Statement No. 15	.....	80,123 60	80,123 60
.....	8,902 00	.....	8,902 00	Law Stamps	.....	8,902 00	8,902 00
.....	.....	45 04	45 04	Bill Stamps	45 04	.....	45 04
868 50	10,038 11	.....	10,038 11	Sundry Minor Revenues	.....	10,038 11	10,038 11
12,259 04	2,253,421 87	.....	2,253,421 87	War Tax Revenue, per Statement No. 4	.....	2,253,421 87	2,253,421 87
.....	398,967 75	.....	398,967 75	Methylated Spirits, per Statement No. 17	.....	398,867 75	398,867 75
.....	2,013 33	1,848 62	3,861 95	Ferry Licenses Revenue	1,848 62	2,013 33	3,861 95
252,593 26	29,962,702 41	23,306 43	29,986,008 84		23,643 02	29,962,365 82	29,986,008 84
.....	252,593 26	.....	252,593 26	LESS—Refunds as per Statement No. 11	.....	252,593 26	252,593 26
.....	29,710,109 15	23,306 43	29,733,415 58		23,643 02	29,709,772 56	29,733,415 58

DR. No. 2.—GENERAL EXPENDITURES for

Balances due to Collectors, etc., April 1, 1917.	Expenditures Authorized by the Department.			Balances due by Collectors, etc., March 31, 1918.	Totals.	Services.
	Salaries.	Contingencies.	Seizures.			
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
49 08	494,788 68	225,248 71	402 62	343 98	720,833 07	Excise and Seizures.....
.....	106,961 01	14,305 76	.....	.....	121,266 77	Preventive service per Statement No. 6 and 7.
.....	4,691 31	40,217 28	.....	.....	44,908 59	Adulteration of Food.....
.....	.....	1,451 73	.....	.....	1,451 73	Sundry Minor Expenditures.....
.....	146,682 18	20,878 59	.....	16 66	167,577 43	Department Expenditures.....
.....	124,386 87	86,673 52	.....	3 70	211,064 09	Weights and Measures.....
.....	54,075 33	12,919 33	.....	212 88	67,207 54	Gas Inspection.....
.....	20,185 63	24,315 25	.....	.....	44,500 88	Electric Light Inspection.....
.....	.....	393,487 59	.....	.....	393,487 59	Methylated Spirits per Statement No. 17.
.....	.....	19,940 78	.....	.....	19,940 78	War Tax per Statement No. 5 ....
49 08	951,771 01	839,438 54	402 62	577 22	1,792,238 47	.....Totals.....

the year ended March 31, 1918. Cr.

Balances due by Collectors, etc., April 1, 1917.	Amount disbursed by Rec. General on requisition of the Department.	Deductions from Salaries.				Annuities.	Balances due to Collectors, etc., March 31, 1917.	Totals.
		Superannuation.	Insurance.	Retirement.	Guarantee.			
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
343 98	695,163 25	3,106 30	4,786 22	15,965 50	1,278 34	140 40	49 08	720,833 07
.....	120,920 92	.....	.....	59 76	286 09	.....	.....	121,266 77
.....	44,878 47	13 92	.....	.....	16 20	.....	.....	44,908 59
.....	1,451 73	.....	.....	.....	.....	.....	.....	1,451 73
16 66	159,744 32	558 38	1,684 36	5,573 71	.....	.....	.....	167,577 43
.....	210,365 54	145 96	216 48	79 92	252 49	.....	3 70	211,064 09
212 88	66,777 30	18 41	.....	90 00	108 95	.....	.....	67,207 54
.....	44,394 38	1 92	41 04	9 96	53 58	.....	.....	44,500 88
.....	393,487 59	.....	.....	.....	.....	.....	.....	393,487 59
.....	19,940 78	.....	.....	.....	.....	.....	.....	19,940 78
573 52	1,757,124 28	3,844 89	6,728 10	21,778 85	1,995 65	140 40	52 78	1,792,238 47

No. 3.—Collection Divisions

Balance due, April 1, 1917.	Amount accrued during Year, including License Fees.							
	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Acetic Acid.	Bonded Manufactures.	Seizures.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
.....	149,933 96	50 00	31,866 60	.....	.....	.....	300 00	.....
112 61	274 99	50 00	3,536 00	7,487 34	6,390 05	.....	2,349 19	50 00
.....	224,408 00	300 00	94,608 47	1,694 42	3,409 45	.....	50 00	4 40
.....	66,563 71	100 00	55,458 84	762,491 57	52,556 80	50 00	6,730 01	.....
.....	15,436 28	50 00	4,084 05	9,297 54	7,349 50	.....	3,983 06	.....
.....	17,515 98	268 75	33,513 43	143,705 52	92,155 52	.....	50 00	.....
.....	412,465 68	100 00	12,114 00	2 00	.....	.....	.....	380 00
.....	26 71	100 00	3,273 00	5,036 71	3,388 86	.....	3,893 95	200 00
.....	50,508 56	50 00	43,200 00	.....	.....	.....	600 00	140 00
.....	.....	50 00	.....	429 24	365 92	.....	.....	.....
.....	96,828 85	100 00	14,100 00	.....	.....	.....	.....	.....
.....	101,465 02	50 00	12,063 30	580 52	918 40	.....	300 00	110 00
.....	.....	100 00	10,774 20	1,406 16	2,990 75	.....	.....	.....
.....	382 70	100 00	1,191 30	3,836 11	1,578 25	.....	50 00	.....
.....	1,238,764 58	300 00	165,112 71	99,205 32	41,195 61	.....	60,217 09	110 60
.....	421,272 36	100 00	41,067 80	35,841 49	25,964 26	.....	6,747 38	.....
522,89	.....	.....	.....	.....	.....	.....	.....	.....
635 50	2,795,847 38	1,868 75	525,963 70	1,071,013 94	238,263 37	50 00	85,270 68	995 00
1,036 08	29,934 89	.....	1,546 23	15,782 48	27,379 41	.....	.....	50 00
2,406 62	4,877,266 74	8,957 60	795,821 47	10,147,467 00	407,722 53	7,279 91	11,227 16	4,304 90
.....	856,192 57	150 00	46,920 00	531,906 78	15,915 40	.....	5,037 17	318 10
.....	218,508 16	50 00	16,707 00	675,356 08	22,783 22	.....	300 00	150 00
.....	80,826 71	.....	2,400 00	48,144 14	15,461 87	.....	300 00	148 85
54,27	250 00	50 00	540 00	21,826 40	1,889 30	.....	.....	250 00
3,295 57	.....	.....	.....	.....	.....	.....	.....	.....
6,792 54	6,062,979 07	9,207 60	863,934 70	11,440,482 88	491,151 73	7,279 91	16,864,33	5,221 85
.....	59,456 18	100 00	5,658 00	1,006 04	6,070 45	.....	921 51	.....
1,442 62	.....	.....	.....	.....	.....	.....	.....	.....
1,442 62	59,456 18	100 00	5,658 00	1,006 04	6,070 45	.....	921 51	.....
.....	13,397 39	150 00	31,546 26	4,927 02	2,420 91	.....	.....	.....
.....	38,193 44	.....	.....	491 56	406 10	.....	.....	100 00
5,860 50	.....	.....	.....	.....	.....	.....	.....	.....
5,860 50	51,590 83	150 00	31,546 26	5,418 58	2,827 01	.....	.....	100 00
.....	.....	.....	.....	25,945 32	.....	.....	.....	.....
.....	1,843,669 04	6,142 15	115,140 95	7,586 53	10,117 97	.....	14,939 86	.....
5,563 99	4,390 82	350 00	99,047 54	9,444 40	5,641 15	.....	5,137 02	.....
.....	35,733 11	200 00	14,719 14	85 96	66 65	.....	.....	200
1,202 09	535,965 45	56,638 20	100,455 60	52,537 94	20,022 75	.....	50 00	416 08
.....	89,514 42	5,779 40	33,600 00	3,356 89	1,925 08	.....	.....	.....
1,202 09	625,479 87	62,417 60	134,055 60	55,894 83	21,947 83	.....	50 00	416 08
.....	7,380 47	50 00	1,415 58	.....	.....	.....	.....	.....
21,497 24	11,486,526 77	80,486 10	1,791,481 47	12,616,878 48	776,086 16	7,329 91	123,183 40	6,932 93
.....	64,783 97	112 49	164,403 08	4,233 14	59 87	.....	.....	4,290 07
.....	11,421,742 80	80,373 61	1,627,078 39	12,612,645 34	776,026 29	7,329 91	123,183 40	2,642 86

IN ACCOUNT WITH REVENUES.

Sundries.	Total Duties Accrued.	Total Debits.	Divisions.	Deposited to the Credit of Receiver General.	Balances due March 31, 1918.	Total Credits.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
7,183 90	189,334 46	189,334 46	Belleville	189,334 46	.....	189,334 46
644 99	20,782 56	20,895 17	Brantford	20,782 56	112 61	20,895 17
10,203 60	334,678 34	334,678 34	Guelph	334,678 34	.....	334,678 34
3,109 16	947,060 09	947,060 09	Hamilton	947,060 09	.....	947,060 09
860 50	41,060 93	41,060 93	Kingston	41,060 93	.....	41,060 93
431 40	287,640 60	287,640 60	London	287,640 60	.....	287,640 60
345 00	425,406 68	425,406 68	Ottawa	425,406 68	.....	425,406 68
601 00	16,520 23	16,520 23	Owen Sound	16,520 23	.....	16,520 23
1,858 05	96,356 61	96,356 61	Perth	96,356 61	.....	96,356 61
31 90	877 06	877 06	Peterborough	877 06	.....	877 06
275 00	111,303 85	111,303 85	Port Arthur	111,303 85	.....	111,303 85
1,322 50	116,809 74	116,809 74	Prescott	116,809 74	.....	116,809 74
54 40	15,325 51	15,325 51	St. Catharines	15,325 51	.....	15,325 51
31 35	7,169 71	7,169 71	Stratford	7,169 71	.....	7,169 71
20,923 50	1,625,829 41	1,625,829 41	Toronto	1,625,829 41	.....	1,625,829 41
26,074 08	557,067 37	557,067 37	Windsor	557,067 37	.....	557,067 37
.....	.....	522 89	Suspense Account	.....	522 89	522 89
73,950 33	4,793,223 15	4,793,858 65	*Ontario*	4,793,223 15	635 50	4,793,858 65
27,115 00	101,808 01	102,844 09	Joliette	101,808 01	1,036 08	102,844 09
7,497 68	16,267,544 99	16,269,951 61	Montreal	16,267,790 72	2,160 89	16,269,951 61
2,134 90	1,458,574 92	1,458,574 92	Quebec	1,458,574 92	.....	1,458,574 92
502 00	934,356 46	934,356 46	Sherbrooke	934,356 46	.....	934,356 46
1,060 00	148,341 57	148,341 57	St. Hyacinthe	148,341 57	.....	148,341 57
.....	24,805 70	24,859 97	Three Rivers	24,805 70	54 27	24,859 97
.....	.....	3,295 57	Suspense Account	.....	3,295 57	3,295 57
38,309 58	18,935,431 65	18,942,224 19	*Quebec*	18,935,677 38	6,546 81	18,942,224 19
376 40	73,588 58	73,588 58	St. John	73,588 58	.....	73,588 58
.....	.....	1,442 62	Suspense Account	.....	1,442 62	1,442 62
376 40	73,588 58	75,031 20	*New Brunswick*	73,588 58	1,442 62	75,031 20
229 30	52,670 88	52,670 88	Halifax	52,670 88	.....	52,670 88
553 00	39,744 10	39,744 10	Pictou	39,744 10	.....	39,744 10
.....	.....	5,860 50	Suspense Account	.....	5,860 50	5,860 50
782 30	92,414 98	98,275 48	*Nova Scotia*	92,414 98	5,860 50	98,275 48
.....	25,945 32	25,945 32	*Charlottetown, P.E.I*	25,945 32	.....	25,945 32
3,901 18	2,001,497 68	2,001,497 68	*Winnipeg, Man*	2,001,497 64	0 04	2,001,497 68
1,533 20	125,544 13	131,108 12	*Calgary, Alberta*	125,544 13	5,563 99	131,108 12
701 00	51,705 86	51,705 86	*Moosejaw, Saskatchewan*	51,705 86	.....	51,705 86
2,343 70	768,429 72	769,631 81	Vancouver	768,429 72	1,202 09	769,631 81
378 70	134,554 49	134,554 49	Victoria	134,554 49	.....	134,554 49
2,722 40	902,984 21	904,186 30	*British Columbia*	902,984 21	1,202 09	904,186 30
100 00	8,946 05	8,946 05	*Yukon*	8,946 05	.....	8,946 05
122,376 39	27,011,281 61	27,032,778 85	TOTALS	27,011,527 30	21,251 55	27,032,778 85
1,524 30	239,406 92	.....	Less Refunds as per Statement No. 11.			
120,852 09	26,771,874 69		NET REVENUE.			

WAR TAX REVENUE, 1917-18.

No. 4.—Stamps, Embossing Cheques, Transportation Tickets, Telegrams, etc.

Provinces.	Amount of stamps sold by Collectors.	Transportation Tickets, Telegrams, Embossing Cheques, etc.	Fines.	Total Deposited to the credit of Receiver General.
	$ cts.	$ cts.	$ cts.	$ cts.
Ontario	502,216 44	139,680 28	2,105 90	644,002 62
Quebec	183,243 86	752,420 45	6,041 00	941,705 31
New Brunswick	26,717 20	72,834 14	600 00	100,151 34
Nova Scotia	28,634 42	8,227 33	50 00	36,911 75
Prince Edward Island	4,798 14	104 35	.....	4,902 49
Manitoba	103,749 73	706 24	3,200 00	107,655 97
Alberta	52,841 60	6,924 32	476 00	60,241 92
Saskatchewan	48,825 63	26 75	350 00	49,202 38
British Columbia	82,367 92	15,408 01	950 00	98,725 93
Yukon	757 70	61 70	.....	819 40
General, U.S.A., etc.	.....	209,102 76	.....	209,102 76
	1,034,152 64	1,205,496 33	13,772 90	2,253,421 87
Less refunds as per statement No. 11	.....	.....	.....	12,259 04
Net War Tax Revenue	.....	.....	.....	2,241,162 83

WAR TAX.

DR. No. 5.—IN ACCOUNT WITH EXPENDITURES. CR.

Amount received from Department to meet Expenditures.	Totals.	Districts.	Expenditures authorized by the Department.			Totals.
			Special Assistance.	Travelling Expenses.	Sundries.	
$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.
1,860 99	1,860 99	Ontario	199 98	1,113 41	547 60	1,860 99
649 85	649 85	Quebec	.....	268 45	381 40	649 85
434 30	434 30	St. John, N.B.	.....	292 50	141 80	434 30
219 49	219 49	Nova Scotia	.....	4 40	215 09	219 49
38 42	38 42	Prince Edward Island	.....	28 85	9 57	38 42
63 60	63 60	Manitoba	.....	.....	63 60	63 60
35 00	35 00	Alberta	.....	.....	35 00	35 00
6 67	6 67	Saskatchewan	.....	.....	6 67	6 67
2,185 78	2,185 78	British Columbia	1,491 93	617 95	75 90	2,185 78
5,494 10	5,494 10	Totals	1,691 91	2,325 56	1,476 63	5,494 10
13,588 68	13,588 68	....General Contingencies	.....	.....	13,588 68	13,588 68
858 00	858 00	....Special War Act Vote	.....	.....	858 00	858 00
19,940 78	19,940 78	....Grand Totals	1,691 91	2,325 56	15,923 31	19,940 78

EXCISE PREVENTIVE SERVICE 1917–18.

No. 6.—In Account with Expenditures.

Dr. | Cr.

Amount received from Department to meet Expenditures.	Deductions from salaries for Insurance.	Deductions from salaries for Guarantee.	Totals.	Districts.	Expenditures authorized by the Department. Salaries.	Special Assistance.	Travelling Expenses.	Sundries.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
21,487 93	.....	57 12	21,545 05	Ontario	20,229 74	164 51	1,055 94	94 86	21,545 05
61,378 94	.....	152 64	61,531 58	Quebec	53,573 75	4,159 01	3,699 45	99 37	61,531 58
1,914 51	.....	2 88	1,917 39	New Brunswick	999 96	799 92	112 00	5 51	1,917 39
1,961 90	.....	2 88	1,964 78	Nova Scotia	999 96	866 42	86 10	12 30	1,964 78
1,239 69	.....	2 88	1,242 57	Prince Edward Island	799 92	300 00	110 80	31 85	1,242 57
4,869 48	.....	13 68	4,883 16	Manitoba	4,749 84	133 32	.....	.....	4,883 16
3,098 38	59 76	8 40	3,166 54	Alberta	3,166 54	.....	.....	.....	3,166 54
1,300 67	.....	2 88	1,303 55	Saskatchewan	1,200 00	.....	98 55	5 00	1,303 55
4,213 52	.....	8 64	4,222 16	British Columbia	3,498 54	716 72	3 40	3 50	4,222 16
101,465 02	59 76	252 00	101,776 78	Totals	89,218 25	7,139 90	5,166 24	252 39	101,776 78
1,747 23	.....	.....	1,747 23	General Contingencies	.....	.....	.....	1,747 23	1,747 23
103,212 25	59 76	252 00	103,524 01	Grand Totals	89,218 25	7,139 90	5,166 24	1,999 62	103,524 01

WEIGHTS AND MEASURES PREVENTIVE SERVICE, 1917-18.

DR. No. 7.—IN ACCOUNT WITH EXPENDITURES. CR.

Amount received from Department to meet Expenditures.	Deductions from Salaries for Guarantee.	Totals.	Districts.	Salaries.	Totals.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.
6,156 66	11 14	6,167 80	Ontario	6,167 80	6,167 80
2,776 70	6 45	2,783 15	Quebec	2,783 15	2,783 15
898 20	1 80	900 00	Nova Scotia	900 00	900 00
914 98	1 65	916 63	Prince Edward Island	916 63	916 63
998 16	1 80	999 96	Manitoba	999 96	999 96
2,994 48	5 40	2,999 88	Alberta	2,999 88	2,999 88
2,969 49	5 85	2,975 34	Saskatchewan	2,975 34	2,975 34
.....	.....	.....	British Columbia	.....	.....
17,708 67	34 09	17,742 76	Grand Totals	17,742 76	17,742 76

No. 8.—STATEMENT showing the quantities of the several articles subject to 1916, 1917, 1918, and

Articles subject to Excise Duty.	1916.			
	Quantities.			Duty.
	Ex-manufactory.	Ex-warehouse.	Totals.	
	Gall.	Gall.	Gall.	$ cts.
Spirits	4,066	3,629,324	3,633,390	8,671,538 55
	.....	85,954	* 85,954	25,786 13
Totals	4,066	3,715,278	3,719,344	8,697,324 68
Malt liquor, the duty being paid on malt	39,488,374	150,503	39,638,877	92,079 45
	Lb.	Lb.	Lb.	
Malt	2,946	89,473,644	89,476,590	2,684,699 63
	No.	No.	No.	
Cigars from foreign leaf	.....	3,800	3,800	26 60
Cigars	134,992,358	72,651,650	207,644,008	623,081 23
Totals	134,992,358	72,655,450	207,647,808	623,107 83
Cigarettes	1,061,670,760	20,653,950	1,082,324,710	3,252,797 58
	Lb.	Lb.	Lb.	
Tobacco from foreign leaf	.....	175	175	43 75
Canada twist	.....	7,430	7,430	743 00
Tobacco	12,996,915	7,149,484	20,146,399	2,015,414 76
Snuff	544,237	.....	544,237	54,423 70
Totals	13,541,152	7,157,089	20,698,241	5,323,422 79
Raw leaf tobacco, foreign	.....	16,571,311	16,571,311	4,676,757 99
Other materials	.....	1,365,175	1,365,175	218,428 00
Total duties on tobacco and cigarettes	.....	.....	.....	10,218,608 78
Vinegar	.....	.....	.....	100,112 24
Acetic acid	.....	.....	.....	8,150 14
Licenses, Spirits	.....	.....	.....	3,750 00
" Malt Liquor	.....	.....	.....	5,700 00
" Malt	.....	.....	.....	4,600 00
" Cigars	.....	.....	.....	12,050 00
" Tobacco	.....	.....	.....	4,175 00
" Bonded manufactures	.....	.....	.....	5,700 00
" Acetic acid	.....	.....	.....	100 00
Grand total duty	.....	.....	.....	22,460,157 75

*Spirits imported for use in the manufacture of crude fulminate, on which duty, at the rate of 30 cents

Excise Duty, taken for consumption during the fiscal years ended March 31, the duty accrued thereon.

1917.				1918.			
Quantities.			Duty.	Quantities.			Duty.
Ex-manufactory.	Ex-warehouse.	Totals.		Ex-manufactory.	Ex-warehouse.	Totals.	
Gall.	Gall.	Gall.	$ cts.	Gall.	Gall.	Gall.	$ cts.
3,080	4,118,147	4,121,227	9,838,649 65	2,413	4,591,972	4,594,385	11,421,503 99
.....	125,140	* 125,140	37,541 90	.....	* 201,326	201,326	60,397 78
3,080	4,243,287	4,246,367	9,876,191 55	2,413	4,793,298	4,795,711	11,481,901 77
34,687,356	139,928	34,827,284	103,865 35	28,316,652	125,775	28,442,427	75,686 10
Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	
225	78,815,521	78,815,746	2,364,752 38	140	59,625,909	59,626,049	1,788,781 47
No.	No.	No.		No.	No.	No.	
.....	.....	.....	.....	.....	.....	.....	.....
166,647,097	73,105,155	239,752,252	719,390 26	177,661,245	76,784,700	254,445,945	766,386 16
166,647,097	73,105,155	239,752,252	719,390 26	177,661,245	76,784,700	254,445,945	766,386 16
1,277,629,790	29,646,960	1,307,276,750	3,929,130 15	1,643,803,653	20,906,280	1,664,709,933	5,002,576 44
Lb.	Lb.	Lb.					
.....	.....	.....	.....	.....	1,732½	1,732½	433 13
.....	5,685	5,685	568 50	.....	4,492	4,492	449 20
12,915,722½	7,206,331½	20,122,054	2,012,205 40	13,938,406½	7,144,922½	21,083,329	2,108,340 69
607,341	.....	607,341	60,734 10	690,615	.....	690,615	69,061 50
13,523,063½	7,212,016½	20,735,080	6,002,638 15	14,629,021½	7,151,147	21,780,168½	7,180,860 96
.....	17,470,422	17,470,422	4,942,516 93	.....	18,146,814	18,146,814	5,151,947 36
.....	1,548,809	1,548,809	247,809 44	.....	1,752,476	1,752,476	280,396 16
			11,192,964 52				12,613,204 48
.....	.....	.....	104,333 79	.....	.....	.....	116,383 40
.....	.....	.....	7,949 39	.....	.....	.....	7,229 91
.....	.....	.....	4,375 00	.....	.....	.....	4,625 00
.....	.....	.....	5,350 00	.....	.....	.....	4,800 00
.....	.....	.....	3,150 00	.....	.....	.....	2,700 00
.....	.....	.....	10,825 00	.....	.....	.....	9,700 00
.....	.....	.....	4,138 00	.....	.....	.....	3,674 00
.....	.....	.....	6,075 00	.....	.....	.....	6,800 00
.....	.....	.....	100 00	.....	.....	.....	100 00
.....	.....	.....	24,403,460 24	.....	.....	.....	26,881,972 29

per gallon, was collected and afterwards refunded, on the exportation of the fulminate.

No. 9.—AMOUNTS deposited to the credit of the Receiver General, on

——	General.	Ontario.	Québec.	New Brunswick.
	$ cts.	$ cts.	$ cts.	$ cts.
Excise	.....	4,792,228 15	18,930,455 53	73,588 58
" Seizures	.....	995 00	5,221 85	.....
Ferries	.....	428 33	1,575 00	10 00
Weights and Measures Inspection	.....	56,131 00	31,628 35	2,164 50
" Seizures	.....	100 00	25 00	.....
Gas Inspection	.....	31,274 95	15,678 35	734 60
Gas Seizures	.....	.....	.....	.....
Electric Light Inspection	.....	33,264 15	17,395 80	2,201 45
" Penalties	.....	.....	.....	.....
Law Stamps (Supreme Court)	.....	2,800 50	.....	.....
" (Exchequer Court)	.....	4,510 50	.....	.....
" (Yukon Territorial Court)	.....	.....	.....	.....
Patent Medicines Fees	260 00	760 00	343 00	24 00
" Fines	.....	.....	.....	.....
Fertilizers Fees	163 00	167 00	121 00	44 00
" Fines	.....	.....	.....	.....
Methylated Spirits	.....	248,897 62	106,774 25	1,998 92
Commercial Feeding Stuffs	111 00	352 00	65 00	.....
" Fines	.....	.....	.....	.....
Adulteration of Food Fees	1,044 00	1,634 95	2,745 00	45 00
Electrical Standard of Laboratory	18 75	147 50	.....	.....
Electric Light Export Licenses	.....	200 00	25 00	.....
Testing Milk Glasses	500 60	1,041 90	21 85	.....
War Tax Revenue Stamps	.....	502,126 44	183,243 86	26,717 20
War Tax Revenue, Transportation, etc	209,102 76	139,680 28	752,420 45	72,834 14
War Tax Fine	.....	1,205 90	6,041 00	600 00
Casual Revenue	141 93	14 83	10 72	.....
Totals	211,342 04	5,818,951 00	20,053,791 01	180,962 39

account of Inland Revenues, during the year ended March 31, 1918.

Nova Scotia.	Prince Edward Island.	Manitoba.	Alberta.	Saskatchewan.	British Columbia.	Yukon.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
92,314 98	25,945 32	2,001,497 64	125,544 13	51,505 86	902,568 13	8,946 05	27,004,594 37
100 00	.....	.....	.....	200 00	416 08	.....	6,932 93
.....	.....	.....	.....	.....	.....	.....	2,013 33
2,972 60	636 45	12,471 30	10,921 15	19,035 15	3,676 15	6 30	139,642 80
.....	.....	.....	2 00	30 25	25 00	.....	182 25
396 90	.....	2,649 40	1,761 50	.....	3,823 35	.....	56,319 05
.....	.....	.....	.....	.....	.....	.....	.....
2,582 05	335 85	7,797 30	5,227 90	1,982 75	8,733 10	.....	79,520 35
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	2,800 50
.....	.....	.....	.....	.....	.....	.....	4,510 50
.....	.....	.....	.....	.....	.....	1,591 00	1,591 00
50 00	4 00	38 00	18 00	19 00	52 00	.....	1,568 00
.....	.....	.....	.....	.....	.....	.....	.....
78 00	5 00	5 00	12 00	4 00	66 00	.....	665 00
.....	.....	.....	.....	.....	.....	.....	.....
6,151 15	25 90	31,465 37	168 65	.....	3,485 89	.....	398,967 75
20 00	.....	56 00	39 00	12 00	41 00	.....	696 00
.....	.....	.....	.....	.....	.....	.....	.....
380 00	60 00	172 00	155 15	78 00	240 30	.....	6,554 40
.....	.....	.....	.....	.....	37 00	.....	203 25
25 00	.....	.....	.....	.....	150 00	.....	400 00
.....	.....	.....	.....	.....	.....	.....	1,564 35
28,634 42	4,798 14	103,749 73	52,841 60	48,825 63	82,367 92	757 70	1,034,152 64
8,227 33	104 35	706 24	6,924 32	26,75	15,408 01	61 70	1,205,496 33
50 00	.....	3,200 00	476 00	350 00	950 00	.....	13,772 90
.....	.....	18 00	366 41	2 82	.....	.....	554 71
141,982 43	31,915 01	2,163,825 98	204,457 66	122,072 21	1,022,039 93	11,362 75	29,962,702 41

EXCISE REVENUES.

No. 10.—Comparative Statement of Receipts for 1915-16, 1916-17 and 1917-18.

—		Totals.
		$ cts.
Spirits	1915–16	8,701,074 68
	1916–17	9,880,566 55
	1917–18	11,486,526 77
Malt Liquor	1915–16	97,779 45
	1916–17	109,215 35
	1917–18	80,486 10
Malt	1915–16	2,689,299 63
	1916–17	2,367,902 38
	1917–18	1,791,481 47
Tobacco	1915–16	10,222,783 78
	1916–17	11,197,102 52
	1917–18	12,616,878 48
Cigars	1915–16	635,157 83
	1916–17	730,215 26
	1917–18	776,086 16
Manufactures in Bond	1915–16	105,812 24
	1916–17	110,408 79
	1917–18	123,183 40
Acetic Acid	1915–16	8,250 14
	1916–17	8,049 39
	1917–18	7,329 91
Seizures	1915–16	10,349 39
	1916–17	8,352 66
	1917–18	6,932 93
Other Receipts	1915–16	80,248 94
	1916–17	113,548 70
	1917–18	122,376 39
Total Revenue	1915–16	22,550,756 08
	1916–17	24,525,361 60
	1917–18	27,011,281 61

No. 11.—Refunds of Revenue during the fiscal year ended March 31, 1918.

Excise Refunds—		
Spirits	$ 64,783 97	
Malt Liquor	112 49	
Malt	164,403 08	
Tobacco	4,233 14	
Cigars	59 87	
Seizures	4,290 07	
Sundries	1,524 30	
		$ 239,406 92
War Tax		12,259 04
Weights and Measures		58 80
Food		868 50
Grand Total		$ 252,593 26

WEIGHTS AND MEASURES, GAS, ELECTRIC LIGHT AND LAW STAMPS.

No. 12.—Statement showing amount of Revenues accrued during the year ended March 31, 1918.

Dr.

—	Weights and Measures Stamps.	Gas Stamps.	Electric Light Stamps.	Law Stamps.			Totals.
				Supreme Court.	Exchequer Court.	Territorial Court.	
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
The amount of stamps in the hands of distributors, April 1st, 1917	161,380 80	65,682 30	109,638 75	512 20	89, 00	8,204 55	345,507 60
To stamps issued by the Inland Revenue Department during the year ended March 31, 1918	134,702 50	66,130 00	61,175 00	2,765 00	4,524 50	3,000 00	272,297 00
Totals	296,083 30	131,812 30	170,813 75	3,277 20	4,613 50	11,204 55	617,804 60

Cr.

By amount of stamps destroyed and returned by distributors	106 45	1,178 55	45 00	.....	.....	.....	1,330 00
By amount of stamps in the hands of distributors, March 31, 1918	156,506 20	74,316 20	91,248 40	476 70	103 00	9,613 55	332,264 05
By balance being the revenue during the year ended March 31, 1918	139,470 65	56,317 55	79,520 35	2,800 50	4,510 50	1,591 00	284,210 55
	296,083 30	131,812 30	170,813 75	3,277 20	4,613 50	11,204 55	617,804 60

WEIGHTS AND MEASURES, 1917--18.

No. 13.—Inspection Division in account with Revenue.

Balances due by Inspectors, April 1, 1917.		Stamps issued to Inspectors.	Other Receipts.	Seizures and Penalties.	Totals.	Divisions.	Returned Damaged Stamps.	Deposited to Credit of Receiver General.	Balances due by Inspectors, March 31, 1918.		Totals.
Stamps on hand.	Cash on hand.								Stamps on hand.	Cash on hand.	
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
9,261 75	50	1,975 00	.....	.....	11,237 25	Belleville	.....	4,290 75	6,946 00	50	11,237 25
5,558 05	11 05	14,175 00	.....	.....	19,744 10	Hamilton	31 25	10,449 35	9,262 90	60	19,744 10
793 05	.....	2,882 50	22 00	15 00	3,712 55	Kingston	.....	3,177 90	534 65	.....	3,712 55
9,213 05	1 35	12,250 00	.....	10 00	21,474 40	London	.....	11,420 85	10,048 45	5 10	21,474 40
8,188 35	8 55	13,770 00	.....	.....	21,966 90	Ottawa	3 00	11,284 00	10,673 40	6 50	21,966 90
4,816 20	75	17,370 00	.....	75 00	22,261 95	Toronto	.....	15,608 15	6,647 30	6 50	22,261 95
37,830 45	22 20	62,422 50	22 00	100 00	100,397 15	*Ontario*	34 25	56,231 00	44,112 70	19 20	100,397 15
47,819 40	5 25	8,350 00	.....	.....	56,174 65	Montreal	.....	13,668 70	42,499 20	6 75	56,174 65
3,242 30	.....	7,187 50	.....	.....	10,429 80	Quebec	.....	5,616 20	4,811 30	2 30	10,429 80
5,233 35	.....	8,722 50	.....	.....	13,955 85	Sherbrooke	.....	7,796 40	6,159 45	.....	13,955 85
6,825 00	.....	.....	50 00	15 00	6,890 00	St. Hyacinthe	.....	1,907 70	4,982 30	.....	6,890 00
2,122 70	.....	3,270 00	.....	10 00	5,402 70	Three Rivers	49 25	2,664 35	2,689 10	.....	5,402 70
65,242 75	5 25	27,530 00	50 00	25 00	92,853 00	*Quebec*	49 25	31,653 35	61,141 35	9 05	92,853 00
886 15	.....	2,480 00	.....	.....	3,366 15	*St. John, N.B.*	.....	2,164 50	1,201 65	.....	3,366 15
3,415 15	.....	1,170 00	.....	.....	4,585 15	Halifax	.....	1,216 00	3,337 90	31 25	4,585 15
3,860 00	4 15	.....	.....	.....	3,864 15	Pictou	50	1,756 60	2,106 05	1 00	3,864 15
7,275 15	4 15	1,170 00	.....	.....	8,449 30	*Nova Scotia*	50	2,972 60	5,443 95	32 25	8,449 30
698 70	.....	675 00	.....	.....	1,373 70	*Charlottetown, P.E.I.*	.....	636 45	737 25	.....	1,373 70
11,440 75	50 90	7,850 00	.....	.....	19,341 65	*Winnipeg, Man.*	.....	12,471 30	6,870 35	.....	19,341 65

No. 13.—Inspection Division in account with Revenue—*Concluded.*

Balances due by Inspectors, April 1, 1917.		Stamps issued to Inspectors.	Other Receipts.	Seizures and Penalties.	Totals.	Divisions.	Returned Damaged Stamps.	Deposited to Credit of Receiver. General.	Balances due by Inspectors, March 31, 1918.		Totals.
Stamps on hand.	Cash on hand.								Stamps on hand.	Cash on hand.	
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
10,316 25	54 80	9,910 00	.....	10 00	20,291 05	Regina	.....	10,229 90	10,056 90	4 25	20,291 05
8,522 20	.....	8,080 00	.....	20 25	16,622 45	Saskatoon	17 90	8,835 50	7,769 05	.....	16,622 45
18,838 45	54 80	17,990 00	.....	30 25	36,913 50	*Saskatchewan*	17 90	19,065 40	17,825 95	4 25	36,913 50
9,827 35	5 55	4,450 00	5 00	2 00	14,289 90	Calgary	2 00	6,389 70	7,897 45	75	14,289 90
1,367 75	7 65	5,005 00	4 25	.....	6,384 65	Edmonton	2 55	4,533 30	1,848 80	.....	6,384 65
11,195 10	13 20	9,455 00	9 25	2 00	20,674 55	*Alberta*	4 55	10,923 00	9,746 25	75	20,674 55
1,841 05	8 90	1,505 00	.....	.....	3,354 95	Nelson	.....	1,247 90	2,105 85	1 20	3,354 95
4,358 90	.....	3,625 00	.....	25 00	8,008 90	Vancouver	.....	2,453 25	5,553 85	1 80	8,008 90
6,199 95	8 90	5,130 00	.....	25 00	11,363 85	*British Columbia*	.....	3,701 15	7,659 70	3 00	11,363 85
1,773 35	.....	.....	.....	.....	1,773 35	*Dawson, Yukon*	.....	6 30	1,767 05	.....	1,773 35
161,380 80	159 40	134,702 50	81 25	182 25	296,506 20	Totals	106 45	139,825 05	156,506 20	68 50	296,506 20
					1,564 35	Milk Test Glassware	.....	1,564 35	.....	.....	1,564 35
					298,070 55			141,389 40			298,070 55
					58 80	Less Refunds as per Statement No. 11	.....	58 80	.....	.....	58 80
161,380 80	159 40	134,702 50	81 25	182 25	298 011 75	Grand totals	106 45	141,330 60	156,506 20	68 50	298,011 75

GAS INSPECTION, 1917-18.

No. 14.—Inspection Districts in Account with Revenue.

Dr. | Cr.

Balances due by Inspectors, April 1, 1917. Stamps on hand.	Balances due by Inspectors, April 1, 1917. —	Stamps issued to Inspectors.	Other Receipts.	Seizures and Penalties.	Totals.	Districts.	Returned Damaged Stamps.	Deposited to Credit of Receiver General.	Balances due by Inspectors, March 31, 1918. Stamps on hand.	Balances due by Inspectors, March 31, 1918. —	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1,308 45		6,550 00			7,858 45	Belleville		2,142 00	5,716 45		7,858 45
3,744 20		5,695 00			9,439 20	Hamilton		5,283 00	4,156 20		9,439 20
3,995 25		5,300 00			9,295 25	London		6,008 20	3,287 05		9,295 25
2,051 90		7,750 00	1 50		9,803 40	Ottawa		2,246 40	7,557 00		9,803 40
3,614 70		15,750 00			19,364 70	Toronto		15,595 35	3,769 35		19,364 70
14,714 50		41,045 00	1 50		55,761 00	*Ontario*		31,274 95	24,486 05		55,761 00
3,367 25		17,275 00			20,642 25	Montreal		14,380 50	6,261 75		20,642 25
617 90		1,300 00			1,917 90	Quebec		779 40	1,138 50		1,917 90
974 70					974 70	Sherbrooke		426 85	547 85		974 70
332 45		200 00			532 45	St. Hyacinthe		91 60	440 85		532 45
5,292 30		18,775 00			24,067 30	*Quebec*		15,678 35	8,388 95		24,067 30
1,958 30		975 00			2,933 30	*St. John, N.B.*		734 60	2,198 70		2,933 30
1,090 25		285 00			1,375 25	*Halifax, N.S.*		396 90	978 35		1,375 25
1,178 55					1,178 55	*Charlottetown, P.E.I.*	1,178 55				1,178 55
30,071 55					30,071 55	*Winnipeg, Man.*		2,649 40	27,422 15		30,071 55
8,127 95		2,000 00			10,127 95	*Calgary, Alta.*		1,761 50	8,366 45		10,127 95
1,681 00		3,000 00			4,681 00	Vancouver		3,069 15	1,611 85		4,681 00
1,567 90		50 00			1,617 90	Victoria		754 20	863 70		1,617 90
3,248 90		3,050 00			6,298 90	*British Columbia*		3,823 35	2,475 55		6,298 90
65,682 30		66,130 00	1 50		131,813 80	Grand Totals	1,178 55	56,319 05	74,316 20		131,813 80

ELECTRIC LIGHT INSPECTION, 1917-18.

No. 15.—Inspection Districts in Account with Revenue.

DR. CR.

Balances due by Inspectors, April 1, 1917. — Stamps on Hand.	Stamps issued to Inspectors.	Totals.	Districts.	Returned Damaged Stamps.	Deposited to Credit of Receiver General.	Balances due by Inspectors, March 31, 1918. — Stamps on Hand.	Totals.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.
3,415 65	1,300 00	4,715 65	Belleville	.....	2,235 45	2,480 20	4,715 65
2,072 85	.....	2,072 85	Fort William	.....	743 70	1,329 15	2,072 85
3,659 40	4,850 00	8,509 40	Hamilton	.....	7,401 45	1,107 95	8,509 40
4,515 40	3,550 00	8,065 40	London	45 00	4,825 60	3,194 80	8,065 40
3,092 15	9,800 00	12,892 15	Ottawa	.....	5,067 75	7,824 40	12,892 15
1,155 85	1,280 00	2,435 85	Sudbury	.....	1,342 05	1,093 80	2,435 85
8,508 10	9,100 00	17,608 10	Toronto	.....	11,648 15	5,959 95	17,608 10
26,419 40	29,880 00	56,299 40	*Ontario*	45 00	33,264 15	22,990 25	56,299 40
5,173 05	12,525 00	17,698 05	Montreal	.....	13,149 45	4,548 60	17,698 05
953 75	2,000 00	2,953 75	Quebec	.....	1,753 35	1,200 40	2,953 75
2,133 10	.....	2,133 10	Sherbrooke	.....	952 65	1,180 45	2,133 10
879 15	560 00	1,439 15	St. Hyacinthe	.....	892 80	546 35	1.439 15
993 55	.....	993 55	Three Rivers	.....	647 55	346 00	993 55
10,132 60	15,085 00	25,217 60	*Quebec*	.....	17,395 80	7,821 80	25,217 60
2,444 90	1,375 00	3,819 90	*St. John, N.B.*	.....	2,201 45	1,618 45	3,819 90
1,683 00	2,550 00	4,233 00	*Halifax, N.S.*	.....	2,582 05	1,650 95	4,233 90
1,533 75	.....	1,533 75	*Charlottetown, P.E.I.*	.....	335 85	1,197 90	1,533 75
43,029 00	.....	43,029 00	*Winnipeg, Man.*	.....	7,797 30	35,231 70	43,029 00
2,592 25	2,200 00	4,792 25	*Regina, Sask.*	.....	1,982 75	2,809 50	4,792 25
9,934 10	3,850 00	13,784 10	Calgary	.....	3,310 95	10,473 15	13,784 10
4,194 60	.....	4,194 60	Edmonton	.....	1,916 95	2,277 65	4,194 60
14,128 70	3,850 00	17,978 70	*Alberta*	.....	5,227 90	12,750 80	17,978 70
4,156 10	4,575 00	8,731 10	Vancouver	.....	6,646 55	2,084 55	8,731 10
2,169 05	1,660 00	3,829 05	Victoria	.....	2,086 55	1,742 50	3,829 05
6,325 15	6,235 00	12,560 15	*British Columbia*	.....	8,733 10	3,827 05	12,560 15
1,350 00	.....	1,350 00	*Dawson, Yukon*	.....	.....	1,350 00	1,350 00
109,638 75	61,175 00	170,813 75	Totals.	45 00	79,520 35	91,248 40	170,813 75
.....	.....	400 00	Export of Electric Power Licenses.—	.....	400 00	.....	400 00
.....	.....	203 25	Electrical Standard—Laboratory Fees.	.....	203 25	.....	203 25
109.638 75	61,175 00	171,417 00	Grand Totals	45 00	80,123 60	91,248 40	171,417 00

No. 16.—STATEMENT showing the Amounts voted and the Expenditures for each Service for the year ended March 31, 1918.

Service.	Grants.	Expenditures.	Over Expended.	Under Expended.
	$ cts.	$ cts.	$ cts.	$ cts.
Minister's salary	7,000 00	7,000 00	.....	.....
Departmental salaries	186,012 50	139,682 18	.....	46,330 32
Departmental contingencies	28,000 00	20,878 59	.....	7,121 41
Excise salaries	606,318 75	494,788 68	.....	111,530 07
Excise contingencies	100,000 00	97,469 19	.....	2,530 81
War tax contingencies	125,000 00	19,082 88	.....	105,917 12
Duty pay at large distilleries and other factories	16,000 00	12,622 13	.....	3,377 87
Duty pay other than special survey	2,000 00	1,291 66	.....	708 34
Preventive service salaries	155,000 00	106,961 01	.....	48,038 99
Preventive service contingencies	18,000 00	14,305 76	.....	3,694 24
Tobacco stamps	130,000 00	102,730 29	.....	27,269 71
Excise commission to custom officers	5,000 00	1,116 15	.....	3,883 85
Provisional Allowance Excise	12,000 00	10,019 29	.....	1,980 71
Provisional Allowance, Weights and Measures	6,000 00	5,487 50	.....	512 50
Provisional Allowance, Gas and Electricity	4,000 00	2,789 53	.....	1,210 47
Methylated Spirits contingencies	500,000 00	393,487 59	.....	106,512 41
Minor Expenditures	500 00	89 28	.....	410 72
Weights and Measures salaries	170,250 00	124,386 87	.....	45,863 13
Weights and Measures contingencies	88,000 00	80,960 57	.....	7,039 43
Gas and Electricity salaries	93,500 00	74,260 96	.....	19,239 04
Gas and Electricity contingencies	59,000 00	33,175 47	.....	25,824 53
Adulteration of Food salaries and contingencies	45,000 00	44,908 59	.....	91 41
Export of Electric Power	1,000 00	869 58	.....	130 42
International Bureau of Weights and Measures	1,200 00	218 85	.....	981 15
International Electro Technical Commission	400 00	400 00	.....	.....
Proprietary or Patent Medicines	2,000 00	1,362 45	.....	637 55
Grand Total	2,361,181 25	1,790,345 05	.....	570,836 20

DR. No. 17.—STATEMENT showing the transactions in connection with the Manufacture of Methylated Spirits for the year ended March 31, 1918. CR.

——		Amounts.	Totals.
		$ cts.	$ cts.
To Stock on hand March 31, 1917.			
Alcohol, 4928·92 Proof gal. at 45c	$ 2,218 01		
Wood Naphtha, 864·2 Proof gal. at 87½c	756 17		
Wood Naphtha, 92 Barrels at $4	368 00		
		3,342 18	
			3,342 18
To Methylated Spirits sold and unpaid on Mar. 31, 1917:—			
43·45 Standard gallons at 83c	36 06		
162·76 " 85c	138 35		
40·88 " 93c	38 02		
4,003·19 " 95c	3,803 03		
206·85 " 1 08c	223 39		
4,696·72 " 1 10c	5,166 38		
377 Barrels at $4; 10 Drums at $15	1,658 00		
		11,063 23	
			11,063 23
To Disbursements for purchase of materials and as per Statement No. 2:—			
Alcohol, 144·935·94 at 45c	65,221 21		
20,822·19 at 60c	12,493 81		
84,506·94 at 62c	52,394 31		
33,717·43 at 65c	21,916 33		
25,334·61 at 68c	17,227 54		
135,885·07 at 72c	97,837 28		
5,493 Barrels at $4	21,972 00		
280 Barrels at $6	1,680 00		
550 Drums at $6	3,300 00		
40 Drums at $17.50	700 00		
		294,742 48	
Less Credit Note	$ 724 22		
Less Refund on account of alcohol lost in transit	43 58		
		767 80	

——		Amounts.	Totals.
		$ cts.	$ cts.
By cash on account of Methylated Spirits sold during the year ended March 31, 1918, as per details:—			
2,306·18 Standard gallons at 50c	$ 1,153 01		
2,508·97 " 95c	2,383 52		
1,550·63 " 1 00	1,550 63		
412·52 " 1 08	445 53		
41,127·27 " 1 10	45,239 87		
4,425·51 " 1 23	5,439 68		
142,956·15 " 1 25	178,693 71		
2,045·32 " 1 48	3,027 09		
72,747·67 " 1 50	109,124 77		
10,200 Barrels at $4	40,800 00		
280 Barrels at $6	1,680 00		
550 Drums at $6	3,300 00		
42 Drums at $10	420 00		
335 Drums at $15	5,025 00		
1 Drum at $2	2 00		
1 Can at 90c	0 90		
2 Cans at 50c	1 00		
1 Can at 40c	0 40		
Express	1 40		
		398,288 51	
Add amount sold in 1916-17 and not paid for:—			
43·45 Standard gallons at 83c	36 06		
162·76 " 85c	138 35		
40·88 " 93c	38 02		
4,003·19 " 95c	3,803 03		
206·85 " 1 08	223 39		
4,696·72 " 1 10	5,166 38		
377 Barrels at $4	1,508 00		
10 Drums at $15	150 00		
		11,063 23	
		409,351 74	

		293,974 68	
Wood Naptha:—			
25,564·44 at 87½	21,898 60		
7·859·00 at 1·05	8,251 95		
17,611·82 at 1·55	27,298 33		
Duty paid on invoices	2,204 70		
987 Barrels at $4	3,948 00		
42 Drums at $10	420 00		
	64,021 58		
Less Refunds on Barrels	10 00		
		64,011 58	
Gasoline.—			
52·2 at 18½c	9 47		
1,113·6 at 39½c	439 93		
93·7 at 32½c	30 46		
		479 86	
To Barrels.—			
4,769 Barrels at $4, 103 Drums at $10, 192 Drums at $15, 2 Drums at $12.50, empty barrels returned, $29.66		23,040 66	
To special assistance	1,904 37		
To freight	8,804 26		
To sundries	1,674 43		
		12,383 06	
Printing	30 40		
Stationery	16 02		
		46 42	
		393,936 26	
Less cartage and freight		448 67	
			393,487 59
To other expenses as follows:—			
Salaries paid by Civil Government		6,500 00	
Salaries paid by General War Vote		858 00	
			7,358 00
Net profits			7,837 44
			423,088 44

Methylated Spirits manufactured during the year—
454,154·28 Proof gallons.

Deduct amount sold in 1917–18, not paid:—			
125·2 Standard gallons at 1 00	125 20		
242·93 " 1 48	359 54		
4,751·30 " 1·50	7,126 86		
688 Barrels at $4	2,752 00		
5 Drums at $15	75 00		
		10,438 60	
		398,913 14	
Add Alcohol sold		54 61	
			398,967 75
Stock on hand March 31, 1918:—			
Alcohol 16,857·56 Proof gallons at 72c		12,137 44	
240 Barrels at $4		960 00	
M. Spts. 6,874·36 Proof gallons at $1.55		10,655 25	
92 Barrels at $4		368 00	
			24,120 69
Grand Total			423,088 44

APPENDIX A.

STATISTICS

SPIRITS.

No. 1.—Comparative Statement of Manufactures for

Provinces.	Licenses.		Materials taken for Use.				
			Grain.				
	No.	Fees.	Malt.	Indian Corn.	Rye.	Oats.	Wheat.
1917.		$	Lb.	Lb.	Lb.	Lb.	Lb.
Ontario	12	2,875	4,299,956	64,648,028	6,653,588	131,580	27,782
Quebec	5	1,250	3,669,397	4,799,459	3,777,229	.....	.....
British Columbia	1	250	.....	.....	.....	.....	.....
Totals	18	4,375	7,969,353	69,447,487	10,430,817	131,580	27,782
1918.							
Ontario	12	2,875	2,101,752	31,924,928	3,803,700	124,460	.....
Quebec	6	1,500	3,191,239	3,708,640	3,223,750	.....	.....
British Columbia	1	250	.....	.....	.....	.....	.....
Totals	19	4,625	5,292,991	35,633,568	7,027,450	124,460	.....

SPIRITS.

the Fiscal Years ended March 31, 1917 and 1918.

Total Grain.	Molasses.	Used in Spirits Manufactured. Grain.	Used in Spirits Manufactured. Molasses.	Proof Spirits Manufactured.	Duty Collected ex-manufactory, on Deficiencies and Assessments.		Total Duty Collected ex-manufactory, including License Fees.
Lb.	Lb.	Lb.	Lb.	Gall.	Gall.	$ cts.	$ cts.
75,760,934	4,072,840	75,542,272	4,072,840	4,667,773·50	3,046·17	7,323 26	10,198 26
12,246,085	23,343,876	12,198,280	23,343,876	1,732,295·44	.....	.....	1,250 00
.....	.....	.....	.....	50·20	33·83	81 19	331 19
88,007,019	27,416,716	87,740,552	27,416,716	6,400,119 14	3,080·00	7,404 45	11,779 45
37,954,840	.....	37,789,012	.....	2,237,158·74	2,005·93	4,814 22	7,689 22
10,123,629	18,171,440	10,267,094	18,171,440	1,329,758·73	406 79	976 30	2,476 30
.....	.....	.....	.....	37·13	.....	.....	250 00
48,078,469	18,171,440	48,056,106	18,171,440	3,566,954·60	2,412·72	5,790 52	10,415 52

SPIRITS.

No. 1A—STATEMENT showing transactions in the Distilleries in the

Divisions.	In Process, including Deficiencies brought forward.	Manufactured, including Surpluses.	Returned to Distillery for Redistillation. In Bond.
	Proof Galls.	Proof Galls.	Proof Galls.
Belleville, Ont.	75,897·24	987,312·08	42,629·27
Guelph, "	2,480 86	12·56	176·46
Hamilton, "	393·20	662·82	409·81
Perth, "	27·67	27·40	.....
Prescott, "	20,622·45	233,485·78	1,967 10
Toronto, "	12,365·71	.....	14,862·77
Windsor, "	60,309 11	1,015,658·10	40,816·60
Totals	172,096 24	2,237,158·74	100,862·01
Joliette, Que.	17,321 54	436,527·90	.....
Montreal, "	55,749·85	826·510 78	59·316·53
St. Hyacinthe, Que.	15,758 37	66,720·05	.....
Totals	88,829·76	1,329,758·73	59,316·53
Vancouver, B.C.	.....	37·13	.....
Grand Totals	260,926·00	3,566,954·60	160,178·54

SPIRITS.

Dominion of Canada, during the Fiscal Year ended March 31, 1918.

Received from other sources.		Totals.	Warehoused.	Fusel Oil Written off, and Removed.	Deficiencies on which Duty was Collected.	In Process, including Deficiencies, carried forward.	Totals.
Duty Paid.	In Bond.						
Proof Galls.	Proof Galls.	Proof Galls.	Proof Galls.	Proof Galls.	Proof Galls.	Proof Galls.	Proof Galls.
1,154 56	.....	1,106,993·15	1,001,469·95	9·021 23	.....	96,501·97	1,106,993·15
1,011·62	74·45	3,755·95	3,000·65	.....	.....	755·30	3,755·95
496·01	.....	1,961·84	1,766·12	.....	39·41	156·31	1,961·84
.....	.....	55·07	27·40	.....	27·67	*.....	55·07
.....	.....	256,075·33	209,245·46	987·01	.....	45,842·86	256,075·33
1,545·75	.....	28,774·23	17,812·08	3·41	1,840·51	9,118·23	28,774·23
4,180·86	.....	1,120,964·67	873,483·13	1,005·42	126·01	246,350·11	1,120,964·67
8,388·80	74·45	2,518,580·24	2,106,804·79	11,017·07	2,033·60	398,724·78	2,518,580·24
.....	.....	453,849·44	451,479·64	.....	.....	2,369·80	453·849·44
413·83	.....	941,990·99	921,328·20	6,932·67	.....	13,730·12	941,990·99
3·53	.....	82,481 95	77,056·85	159·25	406·79	4,859·06	82,481·95
417·36	.....	1,478,322·38	1,449·864·69	7,091·92	406·79	20,958·98	1,478,322·38
.....	.....	37·13	37·13	.....	.....	.....	37·13
8,806·16	74·45	3,996,939·75	3,556,706·61	18,108·99	2,440·39	419,683·76	3,996,939·75

*Written off.

SPIRITS.

E STATEMENT of Warehouse Returns for the Fiscal Years ended March

from other isions.	Totals.	Entered for Consumption.		Removed to other Divisions		Tak Redis
In Transit last year.		Quantity.	Duty.	Warehoused in Divisions to which removed.	In Transit.	
Proof Gallons.	Proof Gallons.	Proof Gallons.	$ cts.	Proof Gallons.	Proof Gallons.	Pr Gal
67,653·78	25,144,924·95	1,350,960·13	3,238,227 99	5,324,973·37	196,540·41	232
50,579·22	7,756,621·19	1,792,791·37	4,295,551 63	1,232,096·87	14,696·13	33
10,186·74	134,736·86	119,492·07	287,037 62	536·53	.....	.....
6,010·20	45,154·54	40,506·14	97,226 48	2,914·14	.....	.....
14,341·53	553·439·69	367,152·60	876,909 36	22,055·52	1,546·47	.....
5,031·21	165,777·67	153,304·18	368,140 41	4,960·70	3,089·26	.....
8,189·09	66,044·51	32,635·37	78,382 34	2,263·55	.....	.....
7,322·13	448,120·27	258,518·51	620,622 27	18,124·92	560·51	
.....	3,895·86	2,787·01	6,689 00	.....	.....	.....
.....	8·612·54	.....	.....	.....	.....	.....
169,313·90	34,327,328·08	4,118,147·38	9,868,787 10	6,607,925·60	216,432·78	265
28,208·23	21,096·300·48	1,160,692·84	2,788,158 16	4,519,091·80	77,641·25	100
134,749·77	7,028,260·10	2,536,174·95	6,060,502 77	1,131,798·88	5,588·59	59
10,382·84	32,932·04	24,761·35	59,456 18	4,623·04	.....	.....
2,070·23	31,328·76	21,469·89	51,590 83	660·69	97·33	.....
33,517·36	973,616·71	769,990·36	1,843,669 04	20,742·68	12,843·51	.....
1,784·46	21,621·28	14,876·67	35,733 11	3,309·48	.....	.....
.....	31,063·69	1,829·18	4,390 82	.....	.....	.....
5,719·89	293,069·34	260,427·21	625,229 87	9,916·28	1,238·57	.....
.....	3,689·60	3,075·01	7,380 47	.....	.....	.....
.....	8,612·54	.....	.....	.....	.....	.....
216,432·78	29,520,494·54	4,793,297·46	11,476,111 25	5,690,142·85	97,409·25	160

* Used in the manufacture of Methylated Spirits at Governmen

Total duty collected ex-n

License fees.....

SPIRITS.

No. 2.—Warehouse Return for the Fiscal Year ended March 31, 1918.

Dr. Cr.

Divisions.	Remaining in Warehouse from last Year.	Warehoused.	Imported.	Received from other Divisions. Removed during year.	Received from other Divisions. In Transit last year	Totals.	Entered for Consumption. Quantity.	Entered for Consumption. Duty.	Removed to other Divisions. Warehoused in Divisions to which removed	Removed to other Divisions. In Transit.	Taken for Redistillation	Free. Legal Allowance.	Free. Other	Exported	Used in Bonded Factories.	Remaining in Warehouse	Totals.
	Proof Gallons.	Proof Gallons.	Proof Gallons	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons	$ cts	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.
Belleville, Ont.	1,457,830 11	1,001,469 95	1,004,856 35	1,994 89	5,236 96	3,471,388 26	62,284 21	149,4[illegible] 96	1,031,416 98	23,372 45	42,629 27	17,128-59	5,887 36	9,234 38	1,211,412-29	1,068,922-73	3,471,388 26
Brantford "	881 60			8,668 22	4,110-23	13,660 54	6,114-58	274 99				57-75		9,849 60	3,666 22	13,660 54	
Guelph "	1,346,651-78	3,960-65		147-36	22 11	1,349 821 91	93,398-99	224,158 00	287,334 32	7,785-92	176 46	37,604 54	930-29	45,802-63	576,998 76	576,998 76	1,349,821 91
Hamilton "	501,815 44	1,766-12		31,490 13		533,671-69	25,874 97	66,219 13	2,969-60		409 81	1,548 49	709-78	949 34	23,951 84	478,675 89	533,671-69
Kingston "	9,142-82			24,056-54		33,199-36	6,431-79	15,835 28						73 10	15,802 29	10,892 18	33,199 36
London "	398-05			7,230-95		7,629 00	7,297-60	17,515 98								331-40	7,629 00
Ottawa "	22,308 94			157,626-77		179,935-71	171,608-83	412,465 68	1,483-75				193 89			6,049-33	179,935 71
" Government Warehouse	4,928 92			395,142 84	4,168 97	405,239-93							70-29		*388,312 08	16,839-56	405,239 93
" Department Laboratory				17-67		17-67							17-67				17 67
Owen Sound, Ont.	5,634 59			13,467 23		19,041 82	1,099	26 71							14,615-92	4,414 91	19,041 82
Perth "	22,654 24	27 40	1,087,375 81	508,383 54	11,198-86	1,629,637 85	24,384-35	40,883 56	5-274 74			547-11		3,860 63	1,581,240 98	14,430 04	1,629,637 85
Port Arthur "	9,094 31			42,106-50	1,813 48	53,014 29	40,335-88	96,838 85	2,785 76	419 10						9,493 55	53,014 29
Prescott, "	457,765 54	209,245-46	146,705-47	22,751 67		836,468 14	21,263-48	101,245 02	354,240 82	5,822-74	1,967 10	3,841-65	260 55	803-10	146,705 47	301,797-23	836,468-14
Stratford "				352 45	140-91	493-36	493-36	382 70								493 36	
Toronto "	3,684,878 00	*70,760-84 †17,812-68 *31-08	687,744 50	663,258 88	1,458 60	5,125,912 93	527,729 54	1,233,847 36	1,409,688-11	10,022 26	14,862-77	61,456-61	2,045-50	14,260 70	888,238-51	2,187,747 93	5,125,912 93
Windsor "	6,527,623 11	873,483-13		35,229-18	60-02	7,436,428 32	179,493 27	420,409 94	1,423,911 72	20,618 78	40,816-00	127,439-67	2,896-45	505,266 44	33,065-62	5,102,988 87	7,436,428 32
Totals.	14,051,067 46	*70,792-83 †1,891-80	2,926,682 13	1,912,205 02	28,208 23	21,090,306 48	1,100,692-84	2,788,158 16	4,519,091 80	77,641 25	100,862-01	240,557-66	13,002 66	580,438-97	*388,312-08	3,824,322-61	21,090,306 48
Joliette, Que.	1,055,192 31	451,479-64		33,531 50		1,540,203-34	11,503-49	26,684 80	531,296 31	171 63		2,538-93				994,793 18	1,540,203 34
Montreal "	1,222,931-40	921,328 29	49,428 13	1,973,951 50	43,599-72	4,210,338-95	2,051,063-66	4,876,766 74	537,114 99	5,101 29	39,316-53	2,321-03	458 11	552 31	92,229-07	1,402,071-92	4,210,338 95
Quebec "	46,468 97			376,555 90	9,375 82	432,400 69	356,453-74	856,192 57					1,460-25		22,957-57	51,509 13	432,400 69
St. Hyacinthe "	282,812 11	*374 72 77,056 85		246,408 51	81,463-28	688,115 47	33,024-81	79,350 41	63,477 58	225-57		2,954-47	24 14	188-83	399,993 36	188,250 71	688,115 47
Sherbrooke "	12,130 18		54,620 45	99,105-30	310 95	157,172-88	84,109 31	218,508 10							54,620 45	18,143 12	157,172-88
Three Rivers "	28 57					28 57										28 57	28 57
Totals.	2,619,569 54	*374 72 1,449,864 68	104,048 58	2,719,652 80	134,749 77	7,028,260-10	2,536,174 95	6,060,502 77	1,131,788 88	5,488-59	39,316 53	7,814 43	1,942-50	741 14	569,799 45	2,715,002-63	7,028,260 10
St. John, N. B.	7,867 25			14,681 95	10,382 84	32,932-04	24,761 35	59,456 18	4 623 04						808 02	2,739 63	32,932 04
Halifax, N. S.				5,516-29	851 07	6,367 36	5,582-25	13,397 39						128 90		650-21	6,367 36
Pictou "	1,024 02			22,118 22	1,210 16	24,901-40	15,887-64	38,193 44	960-69	97 33						8,315-74	24,901 40
Totals.	1,024 02			27,634 51	2,061-23	31,268 76	21,469 89	51,590 83	960-69	97 33				128 90		8,971 95	31,328 76
Winnipeg, Man.	90,069 37			850-034 98	33,517 36	973,616-71	709,990-36	1,843,669 04	20,742 68	12,844-51			5,072 46		58,466 71	186,300 96	973,616 71
Moosejaw, Sask	4,423 53			15,413-29	1,784 46	21,621 28	14,876 67	35,733 11	3,309 48							3,135 13	21,621 28
Calgary, Alta.	6,383-37			24,680-32		31,063 69	1,829-18	4,390 82							17,459 66	11,774 85	31,063-69
Vancouver, B.C.	152,314-03	37 19	1,505 28	92,809 42	684 05	247,349 91	223,143 89	535,715 45	4,146-34	1,238-57		4,690 23	524 23	6,065 03		7,691 62	247,349 91
Victoria, B.C.	10,237 78			30,445 81	5,035 84	45,719 43	37,283-32	89,514 42	5,769 94				69 30	95 28		2,551 59	45,719 43
Totals.	162,551 81	37 13	1,505 28	123,255 23	5 719 89	293,069 34	260,427 21	625,229 87	9,916 28	1,238 57		4,690-23	593 53	6,160-31		10,193 21	293,069-34
Dawson, Y. T.	1,108 85			2,580 75		3,689 60	3,075-01	7,380 47								614 59	3,689-60
Sundries.	8,612 54					8,612 54										8,612 54	8,612 54
Grand Totals.	16,953,808 74	*71,167 57 †3,586,705-01	†1,505 28 3,030,730 71	5,690,142 83	216,432 78	29,520 494 54	4,793,297 46	11,476,111 25	5,690,142 85	97,409 25	160,178 54	261,972 32	20,611 15	587,409 32	*388,312 08 ‡4,571,347 18	12,949,814 00	29,520,494 54

*Re-Warehoused.
†Re-imported

‡ Used in the manufacture of Methylated Spirits at Government Warehouse, Ottawa.

SPIRITS.

No. 3.—Comparative Statement of Warehouse Returns for the Fiscal Years ended March 31, 1917 and 1918.

Dr. Cr.

Provinces.	Remaining in Warehouse from last Year.	Warehoused.	Imported.	Received from other Divisions.		Totals.	Entered for Consumption.		Removed to other Divisions		Taken for Redistillation.	Free.		Exported.	Used in Bonded Factories.	Remaining in Warehouse.	Totals.
				Removed during year.	In Transit last year.		Quantity.	Duty.	Warehoused in Divisions to which removed.	In Transit.		Legal Allowance.	Other.				
1917.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	$ cts.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.
Ontario	17,060,167·89	133 74 5,016,744·14 121,357·35	719,428·67 143·75	2,280,898·53	67,653·78	25,144,924·95	1,350,960·13	3,238,227·99	5,324,973·37	196,540·41	232,624·68	325,303·25	9,850·80	1,280,005·02	*252,546·71 2,114,203·16	14,651,607·46	23,144,624·05
Quebec	2,437,259·62	1,759,067·99 *9·00	109,679·46	3,387,333·74	50,579·22	7,753,621·19	1,792,791·37	4,295,551·63	1,232,068·87	14,606·13	33,014·14	10,988·33	73·60	492·45	2,052,808·76	2,610,309·54	7,753,621·10
New Brunswick	22,850·88			101,699·27	10,188·74	134,738·89	119,492·07	287,037·52	25,587·53					13·33	6,827·68	7,887·25	131,736·80
Nova Scotia	5,427·42			33,710·92	6,010·20	45,154·54	40,586·14	97,228·48	2,914·14					110·24		1,624·02	45,154·54
Manitoba	51,570·42			487,227·74	14,441·53	553,439·69	367,152·60	876,009·36	22,035·52	1,546·47				16·78	72,007·98	90,960·37	553,439·69
Saskatchewan	7,277·79			153,468·67	5,031·21	165,777·67	153,304·18	388,140·41	4,960·70	3,089·26						4,423·53	165,777·67
Alberta	25,429·16			32,427·32	8,189·60	66,044·51	32,635·37	78,383·54	2,263·51						24,762·22	6,383·37	66,044·51
British Columbia	309,575·99	2,602·52	10·23	128,000·40	7,322·13	448,120·27	298,518·81	620,022·27	18,124·92	560·51	117·37	3,986·99	298·87	1,578·72	2,384·67	162,551·81	448,120·27
Yukon Territory	1,342·85			2,553·01		3,895·86	2,787·01	6,689·00								1,108·85	3,895·86
Sundries	8,612·54					8,612·54										8,612·54	8,612·54
Totals	19,929,804·47	*9·00 121,591·09 6,778,414·68	†143·75 820,125·56	6,607,925·60	169,313·90	34,327,328·08	4,148,147·38	9,868,787·10	6,607,925·60	216,432·78	265,156·19	340,278·57	10,232·33	1,289,117·44	*252,546·71 4,273,082·37	16,953,808·74	34,327,328·08
1918.																	
Ontario	14,051,607·46	*70,792·85 2,166,504·79 *374·72	2,926,682·13	1,912,295·02	28,268·23	21,096·360·48	1,160,092·84	2,788,158·16	4,519,091·80	77,641·25	190,862·01	240,587·66	13,002·66	580,438·97	388,312·08 3,024,822·61	16,981,878·60	21,096,360·48
Quebec	2,619,560·54	1,449,864·69	104,048·58	2,719·652·80	134,749·77	7,028,260·10	2,336,174·95	6,060,502·77	1,131,788·88	5,588·59	59,316·53	7,814·43	1,942·50	741·14	569,790·48	2,715,092·63	7,028,260·10
New Brunswick	7,807·23			14,081·85	10,357·84	32,852·04	24,761·38	59,456·18	4,653·04						308·02	2,739·63	32,652·04
Nova Scotia	1,634·02			27,634·51	2,070·23	31,328·76	21,469·89	51,590·83	660·69	97·33				128·99		8,071·95	31,328·76
Manitoba	60,060·37			856,038·88	33,517·36	973,616·71	769,990·36	1,843,669·04	20,742·68	12,843·51			5,072·40		58,466·74	106,590·00	973,616·71
Saskatchewan	4,455·53			15,413·29	1,784·46	21,621·28	14,876·67	35,733·11	3,369·48							3,435·13	21,621·28
Alberta	9,383·32			24,680·32		31,053·69	1,829·18	4,390·82							17,459·66	11,774·85	31,053·69
British Columbia	162,551·81	37·13	1,505·28	122,255·23	5,719·89	293,069·34	260,427·31	625,229·87	9,916·28	1,238·57		4,606·23	593·53	6,100·31		10,199·21	293,069·34
Yukon Territory	1,108·85			2,580·75		3,689·60	3,075·01	7,380·47								614·59	3,689·60
Sundries	8,612·54					8,612·54										8,612·54	8,612·54
Totals	16,953,808·74	*71,167·57 3,556,766·61	*1,505·28 3,030,730·71	5,690,142·85	216,432·78	29,520,494·54	4,793,297·46	11,476,111·25	5,690,142·85	97,409·25	160,178·54	261,972·32	20,611·13	587,409·32	388,312·08 4,571,347·48	12,949,814·00	29,520,494·54

* Re-Warehoused
† Re-imported

* Used in the manufacture of Methylated Spirits at Government Warehouse, Ottawa.

	1917	1918
Total duty collected ex-manufactory and ex-warehouse	$9,876,191·55	$11,481,601·77
License fees	4,375·60	4,625·00
	$9,880,566·65	$11,486,526·77

ı 31, 1917 and 1918.

Cr.

en for illation	Free. Legal Allowance.	Free. Other.	Exported.	Used in Bonded Factories.	Remaining in Warehouse.	Totals.
oof lons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons.	Proof Gallons..
,024·68	325,303·25	9,859·86	1,286,905·92	*252,546·71 2,114,203·16	14,051,607·46	25,144,924·95
,014·14	10,988·33	73·60	492·45	2,052,898·76	2,619,569·54	7,756,621·19
.....	.....	.....	13·33	6,827·68	7,867·25	134,736·86
.....	.....	.....	110·24	.....	1,624·02	45,154·54
.....	.....	.....	16·75	72,607·98	90,060·37	553,439·69
.....	.....	.....	.....	.....	4,423·53	165,777·67
.....	.....	.....	.....	24,762·22	6,383·37	66,044·51
117·37	3,986·99	298·87	1,578·72	2,382·57	162,551·81	448,120·27
.....	.....	.....	.....	.....	1,108·85	3,895·86
.....	.....	.....	.....	.....	8,612·54	8,612·54
,156·19	340,278·57	10,232·33	1,289,117·41	*252,546·71 4,273,682·37	16,953,808·74	34,327,328·08
,862·01	249,557·66	13,002·66	580,438·97	388,312·08 3,924,822·61	* 10,081,878·60	21,096,300·48
,316·53	7,814·43	1,942·50	741·14	569,790·45	2,715,092·63	7,028,260·10
.....	.....	.....	.....	808·02	2,739·63	32,932·04
.....	.....	.....	128·90	.....	8,971·95	31,328·76
.....	.....	5,072·46	.....	58,466·74	106,500·96	973,616·71
.....	.....	.....	.....	.....	3,435·13	21,621·28
.....	.....	.....	.....	17,459·66	11,774·85	31,063·69
.....	4,600·23	593·53	6,100·31	.....	10,193·21	293,069·34
.....	.....	.....	.....	.....	614·59	3,689·60
.....	.....	.....	.....	.....	8,612·54	8,612·54
,178·54	261,972·32	20,611·15	587,409·32	388,312·08 4,571,347·48	12,949,814·09 *	29,520,494·54

	1917.	1918.
t Warehouse, Ottawa.		
ıanufactory and ex-warehouse.....	$9,876,191 55	$11,481,901 77
.....	4,375 00	4,625 00
	$9,880,566 55	$11,486,526 77

MALT.

No. 4.—Comparative Statement of Manufactures for the Fiscal Years ended March 31, 1917 and 1918.

Provinces.	Licenses.		Grain Steeped.	Grain used in Malt Manufactured.	Malt.			Total Duty Collected ex-manufactory, including License Fees.
	No.	Fees.			Manufactured.	Paid Duty.	Warehoused.	
1917.		$	Lb.	Lb.	Lb.	Lb.	Lb.	$ cts.
Ontario	12	2,100	9,474,863	9,999,260	7,972,148	225	7,971,923	2,106 75
Quebec	2	400	32,567,040	32,820,740	25,793,220	.....	25,793,220	400 00
Manitoba	3	450	29,352,000	29,642,400	23,648,220	.....	23,648,220	450 00
Alberta	1	200	26,251,900	26,059,900	21,357,800	.....	21,357,800	200 00
Totals	18	3,150	97,645,803	98,522,300	78,771,388	225	78,771,163	3,156,75
1918.								
Ontario	11	1,900	6,534,285	6,924,383	5,447,198	140	5,447,058	1,904 20
Quebec	2	400	32,193,550	31,987,850	25,270,480	.....	25,270,480	400 00
Manitoba	1	200	23,999,200	23,994,400	19,325,100	.....	19,325,100	200 00
Alberta	1	200	19,607,300	20,951,300	17,092,010	.....	17,092,010	200 00
Totals	15	2,700	82,334,335	83,857,933	67,134,788	140	67,134,648	2,704 20

MALT.

DR. No. 5.—COMPARATIVE STATEMENT of Warehouse Returns

Remaining in Warehouse from last year.	Warehoused.	Increases.	Received from other Divisions.		Imported.	Totals.	Provinces.
			Removed during year.	In Transit last year.			
Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	1917.
12,125,636	7,973,683	96,863	18,946,265	412,800	77,060	39,632,307	Ontario
4,583,227	25,793,220	142,938	25,940,371	1,476,000	311,456	58,247,212	Quebec
.....	.....	.....	880,000	40,000	3,116	923,116	New Brunswick
700	.....	.....	1,778,000	256,000	1,700	2,036,400	Nova Scotia
6,777,146	23,648,220	19,938	3,662	.....	51,112	30,500,078	Manitoba
32,800	.....	466	760,000	80,000	500	873,766	Saskatchewan
3,666,386	21,357,800	34,323	650,200	70,000	30,840	25,809,549	Alberta
174,053	.....	.....	6,407,400	210,000	204,735	6,996,188	British Columbia
4,873	.....	1,346	.....	.....	85,150	91,369	Yukon Territory
27,364,821	78,772,923	295,874	55,365,898	2,544,800	765,669	165,109,985	Totals
							1918.
5,667,699	5,447,058	241,222	10,202,871	499,000	549,284	22,607,134	Ontario
4,869,683	25,270,480	76,076	22,315,341	1,763,110	94,320	54,389,010	Quebec
.....	.....	.....	134,000	80,000	.....	214,000	New Brunswick
39,300	.....	.....	1,078,000	54,000	.....	1,171,300	Nova Scotia
5,924,494	19,325,100	130,548	.....	300	19,400	25,399,842	Manitoba
89,505	.....	1,133	420,000	.....	.....	510,638	Saskatchewan
2,967,026	17,092,010	126,330	40,000	.....	46,792	20,272,158	Alberta
141,401	.....	918	4,016,000	42,000	395,690	4,596,009	British Columbia
34,544	.....	2,222	.....	.....	102,040	138,806	Yukon Territory
19,733,652	67,134,648	578,449	38,206,212	2,438,410	1,207,526	129,298,897	Totals

for the Fiscal Years ended March 31, 1917 and 1918. Cr.

Entered for Consumption.		Removed to other Divisions.		Exported.	Free.	Written off.	Remaining in Warehouse.	Totals.
Quantity.	Duty.	Warehoused in Divisions to which Removed.	In Transit.					
Lb.	$ cts.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
30,615,115	918,733 45	2,219,564	34,410	.....	1,083,659	11,860	5,667,699	39,632,307
30,834,672	925,040 16	16,977,018	120,000	1,837,192	3,516,592	92,055	4,869,683	58,247,212
923,116	27,693 48	.....	.....	.....	.....	.....	.....	923,116
1,979,100	59,373 00	.....	.....	18,000	.....	.....	39,300	2,036,400
3,334,646	100,039 38	18,780,000	712,000	1,585,160	.....	163,778	5,924,494	30,500,078
784,261	23,527 83	.....	.....	.....	.....	.....	89,505	873,766
3,465,407	103,962 21	17,357,116	1,572,000	448,000	.....	.....	2,967,026	25,809,549
6,822,587	204,677 61	32,200	.....	.....	.....	.....	141,401	6,996,188
56,617	1,698 51	.....	.....	.....	.....	208	34,544	91,369
78,815,521	2,364,745 63	55,365,898	2,438,410	3,888,352	4,600,251	267,901	19,733,652	165,109,985
17,468,650	524,059 50	400,178	.....	1,736	974,469	.....	3,762,101	22,607,134
28,784,490	863,534 70	8,258,010	101,200	5,350,432	3,084,929	180,490	8,629,459	54,389,010
188,600	5,658 00	.....	.....	.....	.....	.....	25,400	214,000
1,051,542	31,546 26	95,400	.....	798	.....	.....	23,560	1,171,300
3,831,365	114,940 95	16,851,154	1,839,000	.....	.....	17,970	2,860,353	25,399,842
490,638	14,719 14	.....	.....	.....	.....	.....	20,000	510,638
3,294,918	98,847 54	12,601,470	1,201,180	.....	.....	22,120	3,152,470	20,272,158
4,468,520	134,055 60	.....	.....	.....	.....	.....	127,489	4,596,009
47,186	1,415 58	.....	.....	.....	.....	.....	91,620	138,806
59,625,909	1,788,777 27	38,206,212	3,141,380	5,352,966	4,059,398	220,580	18,692,452	129,298,897

	1917.	1918.
Total duty collected ex-manufactory and ex-warehouse	$ 2,364,752 38	$ 1,788,781 47
License fees	3,150 00	2,700 00
	$ 2,367,902 38	$ 1,791,481 47

MALT LIQUOR.

No. 6.—Comparative Statement of Manufactures for the Fiscal Years ended March 31, 1917 and 1918.

Provinces.	Licenses. No.	Licenses. Fees.	Malt used.	Other Commodities used.	Malt Liquor manufactured.	Malt Liquor exported.	Total Duty collected, ex-manufactory, including License Fees.
1917.		$	Lb.	Lb.	Galls.	Galls.	$ cts.
Ontario	43	2,150	26,351,141	244	13,499,356	4,727	2,304 95
Quebec	14	700	29,156,397	114,880	13,135,010	7,224	28,688 95
New Brunswick	2	100	1,021,907	.....	398,536	3,412	100 00
Nova Scotia	3	150	1,948,999	.....	713,650	81,929⅔	150 00
Manitoba	8	400	2,843,629	17,200	1,666,090	.....	4,254 10
Saskatchewan	4	200	744,172	.....	380,549	.....	428 75
Alberta	7	350	3,074,433	.....	1,820,109	.....	350 00
British Columbia	25	1,250	6,758,664	484,125	3,313,658	20,021⅙	51,899 40
Yukon Territory	1	50	56,707	.....	22,725	.....	50 00
Totals	107	5,350	71,956,049	616,449	34,949,683	117,313$\frac{13}{15}$	88,226 15
1918.							
Ontario	34	1,700	15,211,087	671	8,421,401	33,512	1,868 75
Quebec	12	600	28,098,850	33,280	13,310,934	4,741	9,207 60
New Brunswick	2	100	198,765	.....	81,554	3,428	100 00
Nova Scotia	3	150	1,085,546	.....	379,740	133,287⅙	150 00
Manitoba	8	400	2,961,468	28,843	1,838,477	.....	6,142 15
Saskatchewan	4	200	482,300	.....	321,560	.....	200 00
Alberta	7	350	2,869,032	.....	1,828,098	.....	350 00
British Columbia	25	1,250	4,446,305	494,945	2,517,685	51,355	43,551 35
Yukon Territory	1	50	47,186	.....	18,090	.....	50 00
Totals	96	4,800	55,400,539	557,739	28,717,539	226,323⅙	61,619 85

	1917. Galls.	1918. Galls.
Exported	103,228½	207,985
H.M. Army and Navy, and Ship-Stores	14,085⅔	18,338⅙
	117,313$\frac{13}{15}$	226,323⅙

MALT LIQUOR.

No. 7.—Comparative Statement of Warehouse Returns for the Fiscal Years ended March 31, 1917 and 1918.

Remaining in Warehouse from Last year.	Warehoused.	Totals.	Province.	Entered for Consumption.		Exported.	Remaining in Warehouse.	Totals.
				Quantity.	Duty.			
Galls.	Galls.	Galls.	1917.	Galls.	$ cts.	Galls.	Galls.	Galls.
10,842	159,016	169,858	British Columbia.	139,928	20,989 20	14,002	15,928	169,858
			1918.					
15,928	205,998	221,926	British Columbia.	125,775	18,866, .25	47,362	48,789	221,926

	1917.	1918.
Total duty collected ex-manufactory and ex-warehouse....	$ 103,865 35	$ 75,686 10
License fees	5,350 00	4,800 00
	$ 109,215 35	$ 80,486 10

TOBACCO.

No. 8.—Comparative Statement of Manufactures for

Provinces.	Licenses.		Total Weight of Raw Leaf Tobacco and other Materials actually used.	Tobacco at 10c. per Lb.		
	No.	Fees.		Manufactured.	Paid Duty.	Warehoused.
1917		$ cts.	Lb.	Lb.	Lb.	Lb.
Ontario	9	450 00	1,742,527¼	1,671,527½	680,129½	991,398
Quebec	63	3,050 00	21,875,453½	18,346,629 1/10	11,985,009½	6,361,619⅜
Nova Scotia	2	100 00	1,452	1,549½	1,549½	.....
Prince Edward Island	6	300 00	209,849	237,323	235,414	1,909
Manitoba	2	100 00	1,173	1,107	1,107	....
Alberta	1	50 00	12,513	12,513	12,513	.....
British Columbia	1	50 00	102	.....	.....	.....
Totals	84	4,100 00	23,843,069¾	20,270,649 1/10	12,915,722½	7,354,926⅜
1918						
Ontario	9	450 00	1,842,594½	1,687,697½	773,861½	913,836
Quebec	58	2,900 00	24,605,979½	19,556,286 7/10	12,896,470	6,659,816 7/10
Nova Scotia	2	100 00	678	714	714	.....
Prince Edward Island	3	150 00	229,800	247,566	246,882	684
British Columbia	1	50 00	19,368	20,479	20,479	.....
Totals	73	3,650 00	26,698,420	21,512,743¼	13,938,406½	7,574,336 7/10

the Fiscal Years ended March 31, 1917 and 1918.

Cigarettes at $3 per M.			Cigarettes at $8 per M.			Snuff at 10c. per Lb.			Total Duty Collected ex-Manufactory, including License Fees.
Manufactured.	Paid Duty.	Warehoused.	Manufactured.	Paid Duty.	Warehoused.	Manufactured	Paid Duty.	Warehoused.	
No.	No.	No.	No.	No.	No.	Lbs.	Lbs.	Lbs.	$ cts.
45,021,600	27,273,850	17,747,750	.....	.....	.....	.....	.....	.....	150,284 50
1,651,998,520	1,248,894,820	403,103,700	1,724,260	1,417,120	307,140	613,346	607,341	6,005	5,020,306 47
.....	.....	.....	.....	.....	.....	.....	.....	.....	254 95
.....	.....	.....	.....	.....	.....	.....	.....	.....	23,841 40
33,000	33,000	.....	.....	.....	.....	.....	.....	.....	309 70
.....	.....	.....	.....	.....	.....	.....	.....	.....	1,301 30
38,000	11,000	27,000	.....	.....	.....	.....	.....	.....	83 00
1,697,091,120	1,276,212,670	420,878,450	1,724,260	1,417,120	307,140	613,346	607,341	6,005	5,196,381 32
69,800,460	31,913,700	37,886,760	.....	.....	.....	.....	.....	.....	173,577 25
2,250,066,953	1,610,253,513	639,813,440	1,727,120	1,636,440	90,680	690,765	690,615	150	6,205,460 56
.....	.....	.....	.....	.....	.....	.....	.....	.....	171 40
.....	.....	.....	.....	.....	.....	.....	.....	.....	24,838 20
.....	.....	.....	.....	.....	.....	.....	.....	.....	2,097 90
2,319,867,413	1,642,167,213	677,700,200	1,727,120	1,636,440	90,680	690,765	690,615	150	6,406,145 31

TOBACCO—MANUFACTURED BEFORE JUNE 1, 1908.

No. 9—Comparative Statement of Warehouse Returns for the Fiscal Years ended March 31, 1917 and 1918.

Dr. Cr.

Remaining in Warehouse from last year.	Totals.	Provinces.	Entered for Consumption.		Ship-Stores.	Written off.	Remaining in Warehouse.	Totals.
			Quantity.	Duty.				
Lb.	Lb.	1917.	Lb.	$ cts.	Lb.	Lb.	Lb.	Lb.
461	461	New Brunswick....	.....	.....	....	....	461	461
3,372	3,372	British Columbia...	.....	.....	35	.....	3,337	3,372
19,719½	19,719½	Sundries.....	.....	.....	.....	.....	19,719½	19,719½
23,552½	23,552½	Totals.....	.....	.....	35	....	23,517½	23,552½
		1918.						
461	461	New Brunswick....	.....	.....	.....	.....	461	461
3,337	3,337	British Columbia...	1,732½	433 13	.....	1,604½	.....	3,337
19,719½	19,719½	Sundries.....	.....	.....	.....	.....	19,719½	19,719½
23,517½	23,517½	Totals.....	1,732½	433 13	.....	1,604½	20,180½	23,517½

Exported.			Army, Navy and Ship-Stores.				Free and Written off.		Taken for Re-wo		
Tobacco.	Cigarettes.	Cigarettes, Overweight.	Tobacco.	Cigarettes.	Cigarettes, Overweight.	Snuff.	Tobacco.	Cigarettes.	Tobacco.	Cigarettes.	
Lb.	No.	No.	Lb.	No.	No.	Lb.	Lb.	No.	Lb.	No.	
15,486	10,479,280	....	64,709	43,033,180	39,200	.....	....	2,500	2,039	... .	
29,575 9/10	248,415,400	1,000	58,920 4/8	55,535,810	138,070	665	....	6,800	9,439 2/8	53,500	
.....	... .	....	.....	.....	.....	... ..	.....	...	.....	.....	..
... .	.....	.....	13,505	9,481,000	.....	... ..	.....	.....	.....	.....	..
284	... .	.....	1,625	.....	.....	.....	.....	...	.....	.....	..
... .	.. .	..	37,359	27,482,250	44,300	4,020	. ...	.. ...	..... .	... .	.
.....	... .	.	6,351 1/2	4,808,100	9,000	610	.....	.....	.....	.....	..
... .	....	.. ..	15,651	11,018,350	10,700	.....	..	....	.....	.....	.
45,345 9/10	258,894,680	1,000	198,121 3/10	151,358,690	241,270	5,295	..	9,300	11,478 2/8	53,500	
55,130 1/2	33,173,940	.....	22,414	25,769,230	24,800	. .	.....	6,150	260	.....	.
59,783 2/45	539,439,760	.....	17,278	34,076,120	15,750	150	110 43/45	....	12,295	70,820	4
.....	5,000	....	2,362	3,894,440	.....	.....	....	.....	.. ....	.....	.
.....	.....	.. .	684	.....	.....	.....	.. .	.....	.....	.....	.
.. ..	.....	. . .	3,323	7,829,340	400	.. .	.....	7,000	.....	....	
.....	.....	....	612	2,068,500	15,600	...	.....	.....	.....	... .	..
....	.....	...	5,406 17/45	7,228,350	5,300	...	.....	.....	... ...	.....	..
14,913 49/90	572,618,700	.....	52,079 17/45	80,865,980	61,850	150	110 43/45 *	13,150 10,100	12,555	70,820	4

APPENDIX A.—TOBACCO—*Continued.*

No. 10.—Warehouse Returns for the Fiscal Year ended March 31, 1918.

Dr. Cr.

Divisions	Remaining in Warehouse from last Year: Tobacco	Remaining in Warehouse from last Year: Cigarettes	Remaining in Warehouse from last Year: Cigarettes, Overweight	Warehoused: Tobacco	Warehoused: Cigarettes	Warehoused: Cigarettes, Overweight	Warehoused: Snuff	Received from Other Divisions: Tobacco: Removed during Year	Received from Other Divisions: Tobacco: In transit last Year	Received from Other Divisions: Cigarettes: Removed during Year	Received from Other Divisions: Cigarettes: In transit last Year	Received from Other Divisions: Cigarettes, Over weight: Removed during Year	Totals: Tobacco	Totals: Cigarettes	Totals: Cigarettes, Overweight	Totals: Snuff
	lbs.	No.	No.	lbs.	No.	No.	lbs.	lbs.	lbs.	No.	No.	No.	lbs.	No.	No.	lbs.
Hamilton, Ont.	[illegible]	1,858,220		855,317	37,880,760			70	85	189,000	11,500		1,091,881½	39,955,480		
London "	[illegible]	207,100						4,854		1,498,500	23,400		6,528	4,826,640		
Ottawa "										6,150		10,100		6,150	10,100	
Owen Sound, Ont.								23,677½					23,677½			
Stratford "								25,955½					25,955½			
Toronto "	[illegible]	1,071,600	5,300	58,160				10,052	200	10,271,300	300,000	20,500	82,805½	21,343,100	25,800	
Totals	247,198½	3,237,120	5,300	913,930	37,880,760			66,609	285	21,574,900	336,900	30,600	1,229,828½	66,025,470	35,900	
Montreal, Que.	[illegible]	8,224,170	11,200	6,677,504½	490,821,000	10,600	100	5,721½	571	192,500	16,600	12,200	6,947,360½	645,504,600	114,100	160
Quebec "	[illegible]	735,700		2,100	6,370			2,100	180	1,765,000			5,533	8,005,900		
Sherbrooke, Que.				100	2,029,350			100	80				26,382½			
Totals	[illegible]	8,959,870	11,200	6,679,704½	492,856,720	10,600	100	8,954½	831	1,967,500	16,600	12,200	6,983,276½	653,511,500	114,100	160
Halifax, N.S.	[illegible]	505,000						38,624	3,000	4,250,940	300,000		44,498	5,055,940		
Charlottetown, P.E.I.				684									684			
Winnipeg, Man.	[illegible]	570,900	12,700					2,992	570	7,706,000	136,000		4,039	8,718,050	12,700	
Calgary, Alberta	[illegible]	555,000						705		2,205,000	10,000	16,000	705	2,760,000	16,000	
Vancouver, B.C.	[illegible]	1,176,000	5,300					101,700	50	7,010,000	380,000	2,000	106,774	8,626,500	5,300	
Victoria "	[illegible]	64,250						351		1,044,000	10,000		742	1,118,000		
Totals	[illegible]	1,214,750	5,300					102,141	50	8,149,650	390,000	2,000	107,516	9,745,400	5,300	
Grand Totals	[illegible]	[illegible]	29,510	7,574,336½	657,700,200	10,600	100	239,905½	1,801	51,355,390	1,070,100	60,900	8,370,394½	748,941,130	184,000	160

Divisions	Entered for Consumption: Tobacco	Entered for Consumption: Cigarettes	Entered for Consumption: Cigarettes, Overweight	Entered for Consumption: Duty	Removed to Other Divisions: Tobacco: Warehoused in Divisions to which Removed	Removed to Other Divisions: Tobacco: In transit	Removed to Other Divisions: Cigarettes: Warehoused in Divisions to which Removed	Removed to Other Divisions: Cigarettes: In transit	Removed to Other Divisions: Cigarettes, Over weight: Warehoused in Divisions to which Removed	Exported: Tobacco	Exported: Cigarettes	Army, Navy and Ship-Stores: Tobacco	Army, Navy and Ship-Stores: Cigarettes	Army, Navy and Ship-Stores: Cigarettes, Overweight	Army, Navy and Ship-Stores: Snuff	Free and Written off: Tobacco	Free and Written off: Cigarettes	Free and Written off: Cigarettes, Overweight	Taken for Re-working: Tobacco	Taken for Re-working: Cigarettes	Taken for Re-working: Cigarettes, Overweight	Remaining in Warehouse: Tobacco	Remaining in Warehouse: Cigarettes	Remaining in Warehouse: Cigarettes, Overweight	Totals: Tobacco	Totals: Cigarettes	Totals: Cigarettes, Overweight	Totals: Snuff
	lbs.	No.	No.	$ cts	lbs.	lbs.	No.	No.	No.	lbs.	No.	lbs.	No.	No.	lbs.	lbs.	No.	No.	lbs.	No.	No.	lbs.	No.	No.	lbs.	No.	No.	lbs.
Hamilton, Ont.	812,289	193,510		81,837 87	1,085		300,000	50,000		53,004½	33,179,940	781	1,464,900						200			223,576	4,071,130		1,091,881½	39,955,480		
London "												5,324½	4,148,730									1,100	671,940		6,528	4,826,640		
Ottawa "																	6,150	10,100								6,150	10,100	
Owen Sound, Ont.	23,677½			2,367 75																					23,677½			
Stratford "	25,955½			2,595 55																					25,955½			
Toronto "	51,918	1,000		5,194 80		245	4,800			1,440		16,504½	20,155,600	24,800								12,979	1,187,900	1,000	82,805½	21,343,100	25,800	
Totals	912,940	196,510		91,905 97	1,085	245	304,800	50,000		55,136½	33,179,940	22,114	25,769,230	24,800			6,150	10,100	200			237,554	6,924,740	1,000	1,229,828½	66,025,470	35,900	
Montreal, Que.	6,103,504½	17,520,050	35,016	683,779 03	201,867	22,545	49,979,500	2,911,600	48,000	247,871½	5,959,700	14,213½	29,797,820	15,750	150	110½			11,670	70,820	1,000	346,941½	5,904,800	10,200	6,947,360½	645,504,600	114,100	160
Quebec "	7,80	3,140,150		9,406 45	4,740	100						2,644	1,118,400						80			501	780,540		5,533	8,005,900		
Sherbrooke, Que.	284½			2 40	12,547½	303				11,882		434							5,00						26,382½			
Totals	6,104,170½	20,660,250	35,016	692,779 62	218,654½	23,848	49,979,500	2,911,600	48,000	259,753½	5,959,700	17,278	34,076,120	15,750	150	110½			12,250	70,820	1,000	347,594½	6,685,140	10,200	6,983,276½	653,511,500	114,100	160
Halifax, N.S.	40,724			4,072 39	200	200	25,000				5,000	2,362	3,840,440									923	1,410,500		44,498	5,055,940		
Charlottetown, P.E.I.												684													684			
Winnipeg, Man.	2	5,010		16 73	285		143,000		12,300			3,324	7,829,340	400			7,000					129	753,100		4,039	8,718,050	12,700	
Calgary, Alberta					48		50,000					612	2,008,000	10,500								105	622,400	400	705	2,760,900	16,000	
Vancouver, B.C.	87,097			8,708 70	595	222½	938,500	45,000				5,002½	6,272,000	5,300								13,917	1,376,200		106,774	8,626,500	5,300	
Victoria "												103	355,700									334	103,200		742	1,118,000		
Totals	87,097			8,708 70	595	222½	938,500	45,000				5,604½	6,627,700	5,300								14,251	1,479,400		107,516	9,745,400	5,300	
Grand Totals	7,144,922½	20,871,240	35,016	777,483 32	220,862½	24,293	51,305,300	3,006,600	60,300	314,890½	572,617,700	52,078½	90,905,900	61,450	150	110½	1,150	10,100	12,950	70,820	1,000	609,953½	17,199,270	11,600	8,370,394½	748,941,130	184,000	160

APPENDIX A.—TOBACCO—*Concluded.*

No. 11.—Comparative Statement of Warehouse Returns for the Fiscal Years ended March 31, 1917, and 1918.

Dr. Cr.

Remaining in Warehouse from last year: Tobacco	Cigarettes	Cigarettes, Overweight	Snuff	Warehoused: Tobacco	Cigarettes	Cigarettes, Overweight	Snuff	Received from other Divisions: Tobacco: Removed during year	In transit last year	Cigarettes: Removed during year	In transit last year	Cigarettes, Overweight: Removed during year	In transit last year	Snuff: Removed during year	In transit last year	Totals: Tobacco	Cigarettes	Cigarettes, Overweight	Snuff	Provinces.	Entered for Consumption: Tobacco	Cigarettes	Cigarettes, Overweight	Duty
Lb.	No.	No.	Lb.	Lb.	No.	No.	Lb.	Lb.	Lb.	No.	No.	No.	No.	Lb.	Lb.	Lb.	No.	No.	Lb.	1917.	Lb.	No.	No.	$ cts.
296,292	4,454,400	500		994,398	17,747,750			126,623	1,465	43,304,170	1,146,750	43,500	2,560			1,319,1974	66,671,670	46,560		Ontario	978,678	2,769,790		106,087 17
				25½																				
555,580	24,215,610			6,361,619	893,403,700	367,140	6,000	27,404½	195	18,924,800		2,000		630		6,944,723½	146,344,190	369,140	6,635½	Quebec	6,651,101	26,834,010	41,860	687,951 21
								220								220				New Brunswick	229			22 00
1,056	652,000							69,264	5,077	9,674,000	300,000					70,987	10,026,000			Nova Scotia	69,296			5,929 66
				1,000												1,000				Prince Edward Island				
6,206½	3,207,000	130						41,146½	605	35,075,500	325,000	57,000		4,350	100	48,011	38,596,400	57,000	4,580	Manitoba	5	7,600		23 30
5,470½	694,000				77	77,000		125,958	5,000	12,038,500	870,000	14,000		700		2,025½	5,564,000	9,000	700	Alberta	615			61 50
																136,328½	13,630,500	14,000		British Columbia	117,014½	10,700		11,743 55
					290																			
					7																			
768,498	33,223,010	500	110	7,354,920	920,878	367,140	6,000	400,438½	12,918	122,939,050	2,641,750	125,500	2,560	5,680	100	8,536,948	580,632,860	495,640	11,895	Totals	7,206,331½	29,642,100	34,860	869,788 33
																				1918.				
247,193	9,227,120	5,000		914,836	37,896,700			68,549	282	24,574,900	336,500	39,600				1,229,928½	66,925,370	55,900		Ontario	917,940	196,510		91,905 97
313,583	8,956,720	11,210		6,659,819½	639,813,100	90,880	150	8,844½	832	4,407,800	408,100	12,000				6,983,076½	653,544,900	114,190	150	Quebec	6,084,170½	20,968,220	35,040	652,779 62
2,730	505,000							38,624	3,062	4,256,900	300,000					41,488	5,062,900			Nova Scotia	40,725			4,072 50
				684												684				Prince Edward Island				
862	976,150	12,700						2,662	578	7,796,000	136,000					4,609	8,718,950	12,700		Manitoba	2	5,510		16 73
569	525,000							196		2,207,000	10,000	16,000				765	2,749,000	16,000		Alberta	48			50 00
5,335½	1,274,750	3,100						102,131	56	8,140,650	300,000	2,000				107,516	9,745,300	5,300		British Columbia	87,867			8,708 70
570,288½	21,366,440	32,010		7,574,339½	677,709,200	90,680	150	220,965½	4,804	51,585,300	1,579,100	69,600				8,379,394½	745,941,120	184,090	150	Totals	7,144,922½	20,871,240	35,040	777,483 32

Removed to other Divisions: Tobacco: Warehoused in Divisions to which removed	In Transit	Cigarettes: Warehoused in Divisions to which removed	In Transit	Cigarettes, Overweight: Warehoused in Divisions to which removed	Snuff: Warehoused in Divisions to which removed	Exported: Tobacco	Cigarettes	Cigarettes, Overweight	Army, Navy and Ship Stores: Tobacco	Cigarettes	Cigarettes, Overweight	Snuff	Free and Written off: Tobacco	Cigarettes	Taken for Re-working: Tobacco	Cigarettes	Cigarettes, Overweight	Remaining in Warehouse: Tobacco	Cigarettes	Cigarettes, Overweight	Snuff	[illegible]	[illegible]	[illegible]
Lb.	Lb.	No.	No.	No.	Lb.	Lb.	No.	No.	Lb.	No.	No.	Lb.	Lb.	No.	Lb.	No.	No.	Lb.	No.	No.	Lb.	Lb.	No.	No.
1,501	940	6,720,500	389,600	2,000		15,486	30,479,380	39,240	64,746	43,033,180	39,240		2,500	2,039				247,194½	3,227,120	5,300	10,922	16,057	[illegible]	[illegible]
3,888	305,180,950	1,161,000	123,500	5,050		129,575½	248,410,400	1,000	58,920½	55,595,910	138,670	665	6,800	9,493	53,500	500	920	313,583	8,956,720	11,210	8,944,723½	446,114,190	369,140	[illegible]
																					220			
	40,000								13,805	9,481,000								2,796	505,000		77,667	10,026,000		
						284			1,025												1,000			
10,200,600					540				37,509	27,482,250	14,300	4,020						807	876,950	12,700	48,011	38,596,400	57,000	[illegible]
170,000					160				6,3[illegible]	1,808,100	9,000	616						569	629,000		2,025½	5,564,000	9,000	[illegible]
1,365,000	18,500								18,651	11,018,350	10,700							5,335	1,274,750	3,300	136,328½	13,630,500	14,000	[illegible]
4,819,100	1,579,100	126,500	5,680	1,000		145,345½	258,894,680	1,000	188,121½	154,358,590	241,270	5,295	9,300	11,478½	53,500	500	920	570,288½	15,366,440	32,510	8,536,948	580,632,860	495,640	[illegible]
1,695	215	304,800	50,000			55,130½	33,173,940		22,414	25,703,230	24,800			6,150	250			237,774	6,584,740	1,000	1,229,928½	66,925,370	55,900	
718,875½	33,829	48,802,500	2,931,600	48,600		299,785½	299,405,150	15,750	17,578	84,076,120	15,750	150	110½		12,290	70,820	4,500	347,135½	6,502,100	10,280	6,983,076½	653,544,900	114,190	
280	200	20,000							2,302	3,991,410								923	1,141,500		41,488	5,062,900		
									684												684			
285		143,000		12,300					3,323	7,829,340	400			7,000				429	734,100		4,609	8,718,950	12,700	
48		50,000							612	2,066,500	15,600							105	682,400	400	765	2,749,000	16,000	
595	222½	938,800	45,000						5,406½	7,228,950	5,900							14,205½	1,553,400		107,516	9,745,300	5,300	
5,421,300	1,579,100	1,383,300	3,006,600	60,900		314,915½	572,618,700		52,079½	80,885,980	61,850	150	110½	18,150	12,555	70,820	4,500	560,551½	17,139,250	11,690	8,379,394½	745,941,120	184,090	
														10,100										

Total duty collected ex-manufactory and ex warehouse, including

	1917.	1918.
Canada Twist, Raw Leaf, and Other Materials	$11,192,964 62	$12,643,204 48
License fees	4,138 00	3,674 00
Totals	$11,197,102 62	$12,646,878 48

* Cigarettes, Overweight.

† Re warehoused.

‡ Surplus in warehouse.

TOB Cr.

No. 9—Com

Dr.

Remaining in Warehouse from last year.	T	Cigarettes, Overweight.	Snuff.	Tobacco.	Cigarettes.	Cigarettes, Overweight.	Tobacco.	Cigarettes.	Cigarettes, Overweight.	Snuff.
		...king.		Remaining in Warehouse.			Totals.			
Lb.		No.	Lb	Lb.	No.	No.	Lb.	No.	No.	Lb.
461		. .	....	247,198½	3,227,120	5,300	1,319,927½	66,671,970	46,500	.....
3,372		500	920	313,583	8,956,720	11,210	6,944,729½	446,144,190	309,140	6,635
19,719½		. .	....	....	.....	....	220	....	.....	.....
23,552½		....	....	2,796	505,000	..... .	75,997	10,026,000	.....	. ..
		. .	....	.... . .	.....	.....	1,909	....	.....	.....
461		....	...	807	876,950	12,700	48,014	38,656,400	57,000	4,560
3,337		. .	....	569	525,900	. .....	7,682½	5,504,000	9,000	700
19,719½		....	....	5,335	1,214,750	3,300	138,328½	13,630,300	14,000	.....
23,517½		500	920	570,288½	15,306,440	32,510	8,536,808	580,632,860	435,640	11,895
		. .	....	237,754	6,524,740	1,000	1,229,828½	66,025,370	35,900	.....
		,600	....	347,135 47/60	6,583,110	10,200	6,983,073 17/60	653,644,560	114,190	150
		.	....	923	1,141,500	.....	44,488	5,065,940	.....	.... .
		...	....	....	.....	.....	684	....	.....	.....
		..	...	429	734,100	.....	4,039	8,718,950	12,700	.....
		....	....	105	622,400	400	765	2,740,900	16,000	.....
		....	....	14,205½	1,533,400	.....	107,516	9,745,400	5,300	.....
		,600	....	600,551 47/60	17,139,250	11,600	8,370,394 47/60	745,941,120	184,090	150

RAW LEAF TOBACCO, INCLUDING

DR. No. 12.—COMPARATIVE STATEMENT of Warehouse Returns

Provinces.	Remaining in Warehouse from last year.	Imported.	Warehoused ex-Factory.	Received from Other Divisions.		Totals.
				Removed during the year.	In transit last year.	
1917.	Std. lb.	Std. lb.	Std. lb.	Std. lb.	Std. lb.	Std. lb.
Ontario	3,087,543	3,100,290¾	284,623	62,265	3,886	6,538,607¾
Quebec	11,087,382 35/40	12,753,592½	751,195	265,098⅛	5,377	24,862,645 27/40
New Brunswick	10,574	5,336	.....	.....	.....	15,910
Nova Scotia	4,713	3,666	.....	.....	.....	8,379
Prince Edward Island	19,853	1,767	.....	601	.....	22,221
Manitoba	14,074	12,139	.....	432	.....	26,645
Saskatchewan	680	.....	.....	260	.....	940
Alberta	15,078	107,233	.....	729	.....	123,040
British Columbia	30,737	92,439	5,899	2,579	.....	131,654
Totals	14,270,634 35/40	16,076,463¼	1,041,717	331,964⅛	9,263	31,730,042 17/40
1918.						
Ontario	2,934,109	2,837,489	242,886	59,725	4,757	6,078,966
Quebec	8,988,408⅔	15,155,803½	1,417,069	1,053,193½	31,245 3/10	26,645,719 23/30
New Brunswick	8,742	217	.....	.....	.....	8,959
Nova Scotia	3,545	4,259	1,494	3,228½	260	12,786½
Prince Edward Island	19,032	1,115	.....	325	.....	20,472
Manitoba	8,450	25,321	.....	3,459	311	37,541
Saskatchewan	213	310	.....	914	.....	1,437
Alberta	6,742	28,310	.....	1,224	.....	36,276
British Columbia	36,981	137,395	.....	543	4,943	179,862
Totals	12,006,222⅔	18,190,219⅓	1,661,449	1,122,612	41,516 3/10	33,022,019 7/15

STEMS, SCRAPS, AND CUTTINGS.

for the Fiscal Years ended March 31, 1917 and 1918.

Entered for Consumption.		Removed in Bond to other Divisions.		Exported.	Written off.	Destroyed.	Entered for Manufacture, free.	Remaining in Warehouse.	Totals.
Quantity.	Duty.	Warehoused in Divisions to which removed.	In Transit.						
Std. lb.	$ cts.	Std. lb.	Std. lb.	Std. lb.	Std. lb.	Std. lb.	Std. lb.	Std. lb.	Std. lb.
2,927,934 11/120	837,891 50	176,179 1/8	28,794	441,032	598	797	29,164	2,934,109	6,538,607 3/4
14,312,416 17/24	4,038,224 55	152,527	7,931 3/10	794,816	55	7,912	598,579	8,988,408 3/8	24,862,645 27/40
7,168	2,007 04	....	.....	.....	.....	.....	.....	8,742	15,910
4,233	1,185 24	601	.....	.....	.....	.....	.....	3,545	8,379
3,189	892 92	.....	.....	.....	.....	.....	.....	19,032	22,221
18,195	5,110 00	... ..	.....	.....	.....	.....	.....	8,450	26,645
561	157 08	.....	.....	.....	166	.....	.....	213	940
108,949	31,241 70	2,558	4,791	.....	.....	.....	.....	6,742	123,040
87,776	25,806 90	99	.....	5,395	....	117	1,286	36,981	131,654
17,470,422 53/120	4,942,516 93	331,964 1/8	41,516 3/10	1,241,243	819	8,826	629,029	12,006,222 3/8	31,730,042 17/40
2,795,034	805,468 72	158,042 1/2	1,609	285,490	1,550	205 1/2	169,603	2,667,432	6,078,966
15,139,883 9/20	4,281,435 34	948,505 1/2	7,376	1,459,445 1/2	157	7,249 1/2	1,458,368	7,624,735 1/80	26,645,719 29/40
3,593	1,006 04	5,226	... ...	.....	.....	.....	.....	140	8,959
4,196	1,174 88	2,556	852	1,494	.....	.....	.....	3,688 1/2	12,786 1/2
3,954	1,107 12	.....	.. ..	.....	.....	6,409	.....	10,109	20,472
26,194	7,569 80	1,849	113	.....	.....	146	.....	9,239	37,541
307	85 96	.....	.....	.....	.....	213	.....	917	1,437
31,701	9,444 40	.....	...	490	.....	23	.....	4,062	36,276
141,952	44,655 10	6,433	1,475	2,462	. ...	.....	.....	27,540	179,862
18,146,814 9/20	5,151,947 36	1,122,612	11,425	1,749,381 1/2	1,707	14,246	1,627,971	10,347,862 21/80	33,022,019 7/15

OTHER MATERIALS.

No. 13.—Comparative Statement of Warehouse Returns for the Fiscal Years ended March 31, 1917 and 1918.

Dr. Cr.

Remaining in Warehouse from last year.	Warehoused	Totals.	Provinces.	Entered for Consumption.		Remaining in Warehouse.	Totals.
				Quantity.	Duty.		
Lb.	Lb.	Lb.	1917.	Lb.	$ cts.	Lb.	Lb.
916,748	2,181,019	3,097,767	Quebec. . . .	1,548,075	247,692 00	1,549,692	3,097,767
.....	734	734	Nova Scotia....	734	117 44	.....	734
916,748	2,181,753	3,098,501	Totals.....	1,548,809	247,809 44	1,549,692	3,098,501
			1918.				
1,549,692	2,099,317	3,649,009	Quebec.	1,752,476	280,396 16	1,896,533	3,649,009

CANADA TWIST TOBACCO.

No. 14.—Comparative Statement of Revenue collected for the Fiscal Years ended March 31, 1917 and 1918.

Provinces.	Licenses.		Canada Twist at 10 cts. per lb.	Total Duty Collected, including License Fees.
	No.	Fees.		
1917.		$	Lb.	$ cts.
Ontario	4	8 00	880	96 00
Quebec	15	30 00	4,805	510 50
Totals	19	38 00	5,685	606 50
1918.				
Ontario	2	4 00	580	62 00
Quebec	10	20 00	3,912	411 20
Totals	12	24 00	4,492	473 20

CIGARS.

No. 15.—Comparative Statement of Manufactures for the Fiscal Years ended March 31, 1917 and 1918.

Provinces.	Licenses.		Total Raw Leaf Tobacco and other materials actually used.	Deficiencies Paying Duty.	Cigars at $4.00 per Thousand.			Cigars at $3.00 per Thousand.			Total Duty collected ex-manufactory, including License Fees.
	No.	Fees.		Cigars.	Manufactured.	Paid Duty.	Warehoused.	Manufactured.	Paid Duty.	Warehoused.	
1917.		$ cts.	Lbs.	No.	No.	No.	No.	No.	No.	No.	$ cts.
Ontario	101	4,975 00	1,538,342½	366,375	17,750	2,400	15,350	75,163,565	53,278,045	21,885,520	165,918 83
Quebec	70	3,400 00	2,703,225	222,064	108,149	104,849	3,300	148,726,645	101,159,750	47,566,895	307,965 17
New Brunswick	2	100 00	30,328	.....	.....	.....	.....	1,803,050	178,500	1,624,550	635 50
Nova Scotia	4	200 00	15,917	.....	.....	.....	.....	835,935	661,265	174,670	2,183 79
Manitoba	10	475 00	46,315	23,000	3,825	3,825	.....	2,186,475	1,824,650	361,825	6,033 27
Saskatchewan	1	50 00	658	997	.....	.....	.....	26,675	26,675	.....	133 01
Alberta	9	425 00	101,701	37,135	8,400	8,400	.....	4,634,190	4,626,690	7,500	14,450 07
British Columbia	24	1,200 00	80,801	9,367	900	900	.....	4,132,210	4,112,210	20,000	13,568 36
Totals	221	10,825 00	4,517,287½	658,938	139,024	120,374	18,650	237,508,745	165,867,785	71,640,960	510,888 00
1918.											
Ontario	82	4,100 00	1,540,156½	931,963	224,400	52,250	172,150	76,151,475	52,605,930	23,545,545	164,929 34
Quebec	68	3,350 00	2,898,481	144,209	2,839,244	2,798,344	40,900	160,691,315	108,542,745	52,148,570	340,604 53
New Brunswick	2	100 00	22,985	.....	.....	.....	.....	1,298,250	208,900	1,089,350	726 70
Nova Scotia	4	200 00	15,942	.....	.....	.....	.....	836,245	731,000	105,245	2,393 00
Manitoba	10	475 00	64,879	28,436	25	25	.....	3,113,605	2,915,205	198,400	9,306 02
Saskatchewan	1	25 00	436	3,234	.....	.....	.....	20,650	10,650	10,000	66 65
Alberta	5	250 00	34,047	37,800	.....	.....	.....	1,756,750	1,756,750	.....	5,641 15
British Columbia	24	1,200 00	143,952	32,195	999	999	.....	6,891,610	6,860,610	31,000	21,882,43
Totals	196	9,700 00	4,720,878½	1,177,837	3,064,668	2,851,618	213,050	250,759,900	173,631,790	77,128,110	545,549 82

Memo:

Total number of cigars manufactured :—

1917 237,647,769

1918 253,824,568

CIGARS—*Concluded.*

DR. No. 16.—COMPARATIVE STATEMENT of Warehouse Returns for the Fiscal Years ended March 31, 1917 and 1918. CR.

Remaining in Warehouse from last year.	Warehoused.	Received from other divisions.		Totals.	Provinces.	Entered for Consumption.		Removed to other divisions.		Exported.	Re-worked.	Army, Navy and Ship-Stores.	Remaining in Warehouse.	Totals.
		Removed during the year.	In Transit last year.			Quantity.	Duty.	Warehoused in Divisions to which removed.	In Transit.					
No.	No.	No.	No.	No.	1917	No.	$ cts.	No.	No.	No.	No.	No.	No.	No.
7,004,110	21,899,870	2,387,925	12,500	31,304,405	Ontario	24,260,645	72,783 99	803,000	7,300	19,475	6,200	1,146,045	5,061,740	31,304,405
12,756,130	47,570,195	4,620,550	126,650	65,073,525	Quebec	46,461,965	139,395 62	6,856,550	340,700	2,500	.....	470,750	10,941,060	65,073,525
704,050	1,624,550	.....	.....	2,328,600	New Brunswick	1,632,700	4,898 10	.....	.....	.....	.....	4,000	691,900	2,328,600
133,155	174,670	.....	.....	307,825	Nova Scotia	258,400	775 20	.....	.....	.....	.....	10,000	39,425	307,825
71,300	361,825	570,000	8,500	1,011,625	Manitoba	429,800	1,289 41	113,425	.....	.....	.....	331,525	136,875	1,011,625
.....	7,500	103,000	.....	110,500	Alberta	.....	.....	.....	.....	.....	.....	94,400	16,100	110,500
28,400	20,000	.....	10,000	157,200	British Columbia	61,645	184 94	7,300	.....	.....	.....	64,475	23,780	157,200
20,697,145	71,658,610	7,780,275	157,650	100,293,680	Totals	73,105,155	219,327 26	7,780,275	348,000	21,975	6,200	2,121,195	16,910,880	100,293,680
					1918									
5,061,740	23,717,695	2,843,075	47,350	31,669,860	Ontario	24,395,585	73,334 03	488,375	.....	624,890	.....	483,450	5,677,560	31,669,860
10,941,060	52,189,470	5,514,150	300,650	68,945,330	Quebec	50,170,745	150,547 20	7,954,950	240,650	250,800	.....	212,850	10,115,335	68,945,330
691,900	1,089,350	.....	.....	1,781,250	New Brunswick	1,781,250	5,343 75	.....	.....	.....	.....	.....	.....	1,781,250
39,425	105,245	.....	.....	144,670	Nova Scotia	144,670	434 01	.....	.....	.....	.....	.....	.....	144,670
136,875	208,400	2,000	.....	347,275	Manitoba	270,650	811 95	10,900	.....	.....	6,500	12,225	47,000	347,275
16,100	.....	15,000	.....	31,100	Alberta	.....	.....	.....	.....	.....	.....	25,450	5,650	31,100
23,780	31,000	90,080	.....	144,860	British Columbia	21,800	65 40	10,080	5,950	.....	.....	62,030	45,000	144,860
16,910,880	77,341,160	8,464,305	348,000	103,064,345	Totals	76,784,700	230,536 34	8,464,305	246,600	875,690	6,500	796,005	15,890,545	103,064,345

	1917	1918
Total duty collected, ex-manufactory and ex-warehouse	$ 719,390 26	$ 766,386 16
License fees	10,825 00	9,700 00
Totals	$ 730,215 26	$ 776,086 16

INSPECTION OF PETROLEUM.

No. 17.—Comparative Statement of Inspected Petroleum and Naphtha shipped from Refineries during the Fiscal Years ended March 31, 1917 and 1918.

Provinces.	Licenses.		Petroleum.	Naphtha.	Totals.
	No.	Fees.			
1917.		$	Galls.	Galls.	Galls.
Ontario	5	5	29,952,417·15	27,266,592·99	57,219,010·14
Saskatchewan	1	1	1,911,064·50	2,395,926·20	4,306,990·70
Alberta	3	3	2,447·00	42,715·25	45,162·25
British Columbia	1	1	3,970,409·70	11,277,035·50	15,247,445·20
Totals	10	10	35,836,338·35	40,982,269·94	76,818,608·29
1918.					
Ontario	5	5	30,932,533·21	34,654,242·23	65,586,775·44
Quebec	1	1	2,365,398·00	4,476,187·00	6,841,585·00
Nova Scotia	1	1	.....	.....	.....
Saskatchewan	1	1	4,892,115·70	9,566,957·70	14,459,073·40
Alberta	3	3	34,630·50	362,859·00	397,489·50
British Columbia	1	1	2,873,366·50	10,942,212·80	13,815,579·30
Totals	12	12	41,098,043·91	60,002,458·73	101,100,502·64

MANUFACTURES IN BOND.

No. 18.—Comparative Statement of Manufactures for the Fiscal Years ended March 31, 1917 and 1918.

Provinces.	Licenses.		Materials Used.				Manufactured.		Paid Duty Ex-Manufactory.		Warehoused.		Total Duty Collected ex-Manufactory, including License Fees.
	No.	Fees.	Spirits.	Beer, Wine, etc.	Nitric Acid.	Mercury.	Vinegar.	Crude Fulminate.	Vinegar.	Duty.	Vinegar.	Crude Fulminate.	
1917.		$ cts.	Proof Galls.	Proof Galls.	Lb.	Lb.	Proof Galls.	Lb.	Proof Galls.	Lb.	Proof Galls.	Lb.	$ cts.
Ontario	43	3,225 00	2,135,648·26	141·60 * 3,661·54 1,730·23 †	319,969	34,847	1,824,630·54	61,290·00	486,272·29	19,450 99	1,338,358·25	61,290·00	22,675 99
Quebec	24	2,150 00	2,052,898·76	852·50	280,717	36,900	329,822·49	43,178·10	262,867·86	10,514 72	66,954·63	43,178·10	12,664 72
New Brunswick	1	50 00	6,827·68	19·20	.....	.....	40.726·65	.....	40,726·65	1,629 08	.....	.....	1,679 08
Manitoba	10	500 00	72,607·98	812·81 † 20·90	.....	.....	413,471·84	.....	319,676·55	12,787 06	93,795·29	.....	13,287 06
Alberta	2	100 00	24,762·22	542·40	.....	.....	117,649·99	.....	94,684·73	6,503 79	22,965·26	.....	6,603 79
British Columbia	1	50 00	2,382·57	30·00	.....	.....	11,619·72	.....	11,619·72	464 79	.....	.....	514 79
Totals	81	6,075 00	4,295,127·47	141·60 * 2,543·04 † 5,126·54	600,686	71,747	2,737,921·23	104,468·10	1,215,847·80	51,350 43	1,522,073·43	104,468·10	57,425 43
1918.													
Ontario	48	3,975 00	3,924,822·61	142·00 * 581·34 † 4,273·68	722,627	78,852	2,082,810·54	144,455·00	547,284·87	21,891 47	1,535,525·67	144,455·00	25,866 47
Quebec	23	2,150 00	569,790·45	924·29	257,384	33,825	431,776·10	38,829·00	282,193·06	11,287 69	149,583·04	38,829·00	13,437 69
New Brunswick	1	50 00	808·02	4·40	.....	.....	3,158·26	.....	3,158·26	126 32	.....	.....	176 32
Manitoba	10	475 00	58,466·74	347·70	.....	.....	353,764·72	.....	205,299·19	8,211 92	148,465·53	.....	8,686 92
Alberta	2	100 00	17,459·66	362·25	.....	.....	88,991·82	.....	85,924·21	4,429 98	3,067·61	.....	4,529 98
British Columbia	1	50 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50 00
Totals	85	6,800 00	4,571,347·48	142·00 * 581·34 † 5,912·32	980,011	112,677	2,960,501·44	183,284·00	1,123,859·59	45,947 38	1,836,641·85	183,284·00	52,747 38

*Malt extract. †Vinegar.

DR. No. 19.—COMPARATIVE STATEMENT of Warehouse Returns

Remaining in Warehouse from Last Year.	Warehoused.		Received from other Divisions.	Totals.		Provinces.
			Vinegar.			
Vinegar.	Vinegar.	Crude Fulminate.	Removed during the year.	Vinegar.	Crude Fulminate.	
Galls.	Galls.	Lb.	Galls.	Galls.	Lb.	1917.
243,343·01	1,338,358·25	61,290·00	7,901·20	1,589,602·46	61,290·00	Ontario
60,997·07	66,954·63	43,178·10	.....	127,951·70	43,178·10	Quebec
27,303·70	93,795·29	.....	7·645·74	128,744·73	.....	Manitoba
6,442·62	22,965·26	.....	.....	29,407·88	.....	Alberta
338,086·40	1,522,073·43	104,468·10	15,546·94	1,875,706·77	104,468·10	... Totals
						1918.
378,700·52	1,535,525·67	144,455·00	.....	1,914,226·19	144,455·00	Ontario
47,800·71	149,583·04	38,829·00	.....	197,383·75	38,829·00	Quebec
.....	.....	.....	18,629·40	18,629·40	.....	New Brunswick
93,795·29	148,465·53	.....	25,206·72	267,467·54	.....	Manitoba
15,277·27	3·067·61	.....	.....	18,344·88	.....	Alberta
535·573·79	1,836,641·85	183,284·00	43,836·12	2,416,051·76	183,284·00	.....Totals

IN BOND—*Concluded.*

for the Fiscal Years ended March 31, 1917 and 1918. CR.

Entered for Consumption.		Removed to other Divisions.		Exported.	Remaining in Warehouse.	Totals.	
		Vinegar.	Vinegar.				
Vinegar.	Duty.	Warehoused in Divisions to which removed.	In Transit.	Crude Fulminate.	Vinegar.	Vinegar.	Crude Fulminate.
Galls.	$ cts.	Galls.	Galls.	Lb.	Galls.	Galls.	Lb.
1,195,355·00	47,814 15	15,546·94	.....	61,290·00	378,700·52	1,589,602·46	61,290·00
80,150·99	3,206 01	.....	.....	43,178·10	47,800·71	127,951·70	43,178·10
34,949·44	1,397 98	.....	.....	.....	93,795·29	128,744·73	.....
14,130·61	565 22	.....	.....	.....	15,277·27	29,407·88	.....
1,324,586·04	52,983 36	15,546·94	.....	104,468·10	535,573·79	1,875,706·77	104,468·10
1,485,105·20	59,404 21	25,206·72	4,435·33	144,455·00	399,478·94	1,914,226·19	144,455·00
85,665·75	3,426 64	18,629·40	.....	38,829·00	93,088·60	197,383·75	38,829·00
18,629·40	745 19	.....	.....	.....	.....	18,629·40	.....
156,323·34	6,252 94	.....	.....	.....	111,144·20	267,467·54	.....
15,176·02	607 04	.....	.....	.....	3,168·86	18,344·88	.....
1.760,899·71	70,436 02	43,836·12	4,435·33	183,284·00	606,880·60	2,416,051·76	183,284·00

	1917.	1918.
Total duty collected, ex-manufactory and ex-warehouse....	$ 104,333 79	$ 116,383 40
License fees	6,075 00	6,800 00
Totals.....	$ 110,408 79	$ 123,183 40

ACETIC [illegible] D.

No. 20.—Comparative Statement of Manufactures for the Fiscal Years ended March 31, 1917 and 1918.

Provinces.	Licenses.		Manufactured.	Duty ex-Manufactory.		Warehoused.	Total Duty Collected ex-Manufactory, including License Fees.
	No.	Fees.	Acetic Acid.	Acetic Acid.	Duty.	Acetic Acid.	
1917.		$ cts.	Galls.	Galls.	$ cts.	Galls.	$ cts.
Ontario	1	50 00	112,873·82	....	.....	112,873,82	50 00
Quebec	1	50 00	243,485·33	198,734·89	7,949,39	44,750·44	7,999 39
Totals	2	100 00	356,359·15	198,734·89	7,949·39	157,624·26	8,049 39
1918.							
Ontario	1	50 00	82,008·40	.....	.....	82,008·40	50 00
Quebec	1	50 00	205,834·79	180,748·80	7,229·91	25,085,99	7,279 91
Totals	2	100 00	287,843·19	180,748·80	7,229·91	107,094·39	7,329 91

ACETIC ACID.

No. 21.—Comparative Statement of Warehouse Returns for the Fiscal Years ended March 31, 1917 and 1918.

Dr. Cr.

Warehoused.	Total.	Provinces.	Exported.	Total.
Acetic Acid.	Acetic Acid.		Acetic Acid.	Acetic Acid.
Galls.	Galls.	1917.	Galls.	Galls.
112,873·82	112,873·82	Ontario	112,873·82	112,873·82
44,750·44	44,750·44	Quebec	44,750·44	44,750·44
157,624·26	157,624·26	Totals	157,624·26	157,624·26
		1918.		
82,008·40	82,008·40	Ontario	82,008·40	82,008·40
25,085 99	25,085·99	Quebec	25,085·99	25,085·99
107,094 39	107,094·39	Totals	107,094·39	107,094·39

	1917.	1918.
	$ cts.	$ cts.
Total duty collected ex-manufactory	7,949 39	7,229 91
License fees	100 00	100 00
	8,049 39	7,329 91

APPENDIX B.

EXPENDITURES, ETC.

STATEMENT No. 1.—Showing the Amount paid during the Year 1917-18 to different Companies for guaranteeing Outside Officers of the Inland Revenue Department.

—	Amounts paid.
	$ cts.
Railway Passengers Assurance Co.	183 97
The Imperial Guarantee and Accident Insurance Co. of Canada	468 73
The Dominion of Canada Guarantee and Accident Insurance Co.	362 43
The Guarantee Co. of North America	469 96
London, Guarantee and Accident Co.	154 21
The Employers Liability Assurance Corporation, Limited	358 85
Total	1,997 97

No. 2.—STATEMENT showing the number of parties under Licenses for the Year 1917-18.

Divisions.	Distillers.	Brewers and Malsters.	Brewers.	Malsters.	Tobacco Manufacturers.	Cigar Manufacturers.	Bonded Warehouses.	Manufacture in Bond (Vinegar).	Chemical Stills.	Manufacturers of stills.	Acetic Acid Manufacturers.	Mfrs. of Pharmaceutical Prep's.	Manufacturers of Perfumes.	Petroleum Refiners.	Wood Alcohol Manufacturers.	Manufacturers in Bond (Sundries).	Malt Vinegar Brewers.	Manufacturers in Bond (Explosives).	Rectifiers.	Mfrs. in Bond (Vinegar) Distillers.
Belleville	1	..	1	..	..	....	1	..	...	..	..	..	..	..	..	..	..	..	..	1
Brantford	..	..	1	1	..	4	...	1	2	..	..	..	..	..	..	..	..	..	..	..
Guelph	..	1	5	2	..	5	1	..	2	..	..	..	..	..	..	1	..	..	..	..
Hamilton	1	1	1	..	1	8	1	2	4	..	1	..	..	..	..	1	..	..	..	..
Kingston	..	..	1	..	.	2	....	..	2	..	.	1	..	..	..	1	..	..	..	..
London	..	2	..	.	..	24	3	..	4	..	..	..	..	3	..	1	..	..	..	..
Ottawa	..	..	2	..	..	....	3	..	2	..	..	..	..	..	1	.	..	..	..	..
Owen Sound		..	2	..	..	1	....	1	...	..	..	..	..	..	1	..	..	..	..	..
Perth	2	..	1	..	.	....	....	..	3	..	..	1	1	..	..	1	..	1	..	..
Peterborough	..	..	1	..	..	2	....	..	1	..	..	..	..	..	2	..	..	..	..	..
Port Arthur	..	..	2	..	..	....	5	..	1	..	..	..	..	..	..	..	..	..	..	..
Prescott	1	..	1	..	..	2	....	..	....	..	..	..	..	..	..	1	..	..	..	..
St. Catharines	..	..	2	..	..	7	..	..	2	..	..	..	..	..	..	..	..	..	..	..
Stratford	..	..	2	..	..	2	....	.	....	..	..	..	1	..	..	..	..	..	..	..
Toronto	1	3	3	..	4	18	9	3	32	3	..	5	7	2	4	4	2	2	1	..
Windsor	1	..	2	1	4	7	1	1	4	..	..	5	2	..	..	1	..	..	..	1
Ontario	7	7	27	4	9	82	24	8	59	3	1	12	11	5	8	11	2	3	1	2
Joliette	1	..	..	.	5	9	....	..	1	..	..	..	..	..	..	..	..	..	..	..
Montreal	2	1	3	1	37	38	30	2	18	..	1	3	7	1	2	4	..	1	..	..
Quebec	..	..	2	..	6	2	18	2	....	..	..	..	..	..	..	1	..	..	..	..
St. Hyacinthe	1	..	..	..	5	7	5	..	....	..	..	..	..	..	..	..	..	1	1	..
Sherbrooke	..	..	1	..	1	7	4	..	....	..	..	..	.	..	2	1	..	.	..	..
Three Rivers	..	.	1	..	3	4	..	..	....	..	1	..	..	..	..	..	..	..	.	..
Quebec	4	1	7	1	57	67	57	4	19	..	2	3	7	1	4	6	..	2	1	..
St. John, New Brunswick	.	..	2	..	.	2	5	1	1	..	..	..	..	..	..	..	..	..	..	..
Halifax	..	..	3	..	..	3	4	..	1	..	..	..	..	1	..	..	..	..	..	..
Pictou	..	.	..	..	1	1	13	.	....	..	..	..	..	..	..	..	..	.	..	..
Nova Scotia	..	..	3	..	1	4	17	..	1	..	..	..	.	1	..	..	..	..	..	..
Charlottetown, Prince Edward Island	..	..	..	..	3	....	....	..	....	..	..	..	..	..	..	..	..	..	..	..
Winnipeg, Manitoba	..	..	8	1	.	10	39	3	13	..	..	2	3	..	..	3	..	..	..	..
Moose Jaw	..	..	4	..	..	1	4	..	2	..	..	..	..	1	..	2	..	..	..	..
Calgary, Alberta	..	..	7	1	..	5	2	2	9	..	..	..	..	3	..	..	..	..	..	..
Vancouver	1	..	18	..	1	17	24	1	16	.	..	..	..	1	..	1	..	..	..	..
Victoria	..	.	6	..	..	7	6	..	3	..	..	.	..	..	.	..	..	..	..	..
British Columbia	1	..	24	.	1	24	30	1	19	..	..	..	..	1	..	1	..	..	..	..
Dawson, Yukon Territory	..	..	1	.	..	....	2	..	....	.	..	..	..	..	..	..	..	..	..	.
Grand Totals	12	8	83	7	71	195	180	19	123	3	3	17	21	12	12	23	2	5	2	2

No. 3.—Summary Statement showing the number of Permanent Officers employed in the different services of the Inland Revenue Department during the Year ended March 31, 1918.

—	For the year.	Part of year.	Dead.	Services dispensed with.	Superannuated.	Resigned.	Total.
Departmental Staff	75	9	1			2	87
Excise	333	1	6	4	5	1	350
Excise and Gas	6						6
" Food	10						10
" Gas and W. and M	1						1
" " Electricity	2						2
" Electricity and W. and M	1						1
Food	1	2		1			4
" and W. and M	2						2
Preventive	99	11					110
" and Food	2						2
" and W. and M	1						1
Weights and Measures	108	3	5	1		3	120
" Gas	1						1
Gas	44	2	1	1		1	49
Electricity	14					1	15
Total	700	28	13	7	5	8	761

REPORTS, RETURNS AND STATISTICS

OF THE

INLAND REVENUES

OF THE

DOMINION OF CANADA

For the Fiscal Year ended March 31

1918

PART II

WEIGHTS AND MEASURES, GAS AND ELECTRICITY

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1918

[No. 13—1919.]

REPORT

OF THE

ASSISTANT DEPUTY MINISTER OF INLAND REVENUE

ON THE

INSPECTION OF WEIGHTS AND MEASURES, GAS AND ELECTRICITY.

To the Honourable
The Minister of Customs and Inland Revenue.

SIR,—I have the honour to submit the annual report on the inspection of weights and measures, gas and electricity, also statements in connection therewith for the fiscal year ended March 31, 1918.

GEO. W. TAYLOR,
Asst. Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, July 10, 1918.

Mr. E. O. Way, Chief Inspector of Weights and Measures, Standards Branch, reports as follows:—

The total revenue collected on account of Weights and Measures Inspection for the year ending March 31, 1918, amounts to $141,389.40 as against $131,625.60 for the corresponding year ending March 31, 1917, showing an increase over last year of $9,763.80.

The total expenditure was $211,060.39 as against $188,086.60 expended during the year ending March 31, 1917, showing an increase of $22,973.79.

Appendix "A" gives a summary statement of the receipts and expenditures by provinces.

The revenue collected represents 66·99 per cent of the total expenditure as against 69·9 per cent last year—the slight increase in the deficit being due to the increased cost of travelling and freight charges, and to increased salaries to meet the increased cost of living, whereas no advance has been made in inspection fees to meet this increased cost of inspection.

Efficiency in transportation is leading to heavier loads and larger scales to weigh same. This development demands larger quantities of standard weights for inspection work, the cartage and transportation of which is both costly and difficult. Complaints of weight discrepancies over railway track scales are increasing in number and importance every year, so that it is becoming apparent that this service will have to be provided with special test cars of from 30,000 to 60,000 pounds capacity with which to make these inspections, since it is obviously an imposition to attempt the inspection of 100- and 150-ton scales with one or two tons of weights, as in the past.

In Appendices "B" and "C" will be found statistical statements of the various weights and measures, etc., submitted for inspection, with the results by provinces, of which the following is a summary:—

——	Presented.	Verified.	Rejected.	Percentage of Rejections.
Weights	69,627	69,190	437	0·62
Measures of capacity	191,277	191,221	56	0·03
Measures of length	8,202	8,140	62	0·75
Weighing machines	112,848	108,648	4,200	3·72
Measuring machines	7,278	7,158	120	1·65
Metric weights and measures	344	344	.....	.....
Metric scales	409	408	1	0·24

During the year, 135 seizures have been made and fourteen prosecutions, nine cases resulting in convictions and fines. Only serious cases are prosecuted, such as the use of falsified measures or tampering with a scale to make it weigh unjustly; ordinary seizures being settled by the confiscation of the article without prosecution.

Both seizures and prosecutions show a considerable increase over last year.

Under the Milk Test Act, 31,884 pieces of Babcock glassware have been tested by the Weights and Measures Standards Branch itself, producing a revenue of $1,564.45.

THE METRIC SYSTEM.

This subject is still in the forefront of discussion, the two great non-metric countries, England and the United States, being divided into two militant camps of "pros" and "antis."

There is no question but that great benefits would result did the whole world use but one system of weights and measures, but there is equally no question but that great disorganization, confusion, expense, inefficiency, and obstruction would result to Anglo-American production were the metric system to be compulsorily adopted.

In this connection I feel it would be wise to cite the decision of "*The Committee on Commercial and Industrial Policy after the War*" appointed by the British Government under the chairmanship of Lord Balfour of Burleigh, which, after two years of work, has just reported. Quotations from the report follow:—

> "This change has been strongly urged upon us from various quarters, but it cannot be said that there is any such general agreement of opinion in its favour among those who have studied the subject as would justify its adoption.
>
> ". . . in view of the exceptional difficulties with which trade will be faced during the period immediately following the war, special weight must be attached to the consequences which are likely to arise during that period. In our opinion it is absolutely certain that the anticipated uniformity could not be obtained for a very long period, if ever.
>
> "There is further the serious objection that if we induced the above-mentioned countries (non-metric) to change over to the metric system, we should be surrendering to Germany the advantage which our manufacturers now enjoy over here both in their markets and in our own, particularly as for some years to come *we should have to manufacture on*

both systems, while Germany would be enabled to manufacture on one uniform system for the German market and nearly the whole of her export trade.

"We are not satisfied by any evidence which has been brought before us that trade has actually been lost to this country owing to the fact that the use of the metric system is not compulsory . . . But to attempt to make the use of the system universal and obligatory in this country would cause great loss and confusion at a particularly inopportune moment for the sake of distant and doubtful advantages. We are convinced that, so *far from assisting* in the re-establishment of *British Trade after the War*, such a measure would seriously hamper it.

"Our weights and measures are capable of detailed improvements . . . but we are not convinced that the metric system is upon the whole even theoretically superior to the British system, and *we are satisfied that the practical objections to the proposed change are such as decisively to outweigh any advantages which are claimed for it.*"

Mr. Ormond Higman, Chief Engineer of Gas and Electricity, reports that there has been during the past year a slight improvement in respect to the amount of work done by the Electricity and Gas Inspection services. The number of electricity meters tested during the year which ended March 31, 1918, was 127,393 as against 114,390 for the previous year. Gas meters tested, 75,166, as against 72,187 for the previous year.

The revenue and expenditure account for the fiscal year is as follows:—

——	Revenue.	Expenditure.
Electricity inspection	$79,520 35	$44,500 88
Gas inspection	56,319 05	66,994 66
Totals	$135,839 40	$111,495 54

showing a surplus of revenue over expenditure of $24,343.86.

The details in regard to the work done in connection with these services will be found in the appendices to this report.

APPENDIX A.

STATEMENT of Weights and Measures Expenditures and Revenues during the fiscal year ended March 31, 1918.

Provinces.	Expenditures.							Revenues.
	Salaries.	Special Assistance.	Seizure Expenses.	Rent.	Travelling Expenses.	Sundries.	Total.	
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Ontario	45,449 95	1,972,73	6 60	572 00	12,631 49	903 47	61,536 24	56,231 00
Quebec	32,784 90	7,345 37	.....	3,008 34	9,979 11	1,043 14	54,160 86	31,653 35
New Brunswick	5,349 96	.....	.....	.....	509 21	98 37	5,957 54	2,164 50
Nova Scotia	5,399 76	907 72	.....	253 68	1,291 86	268 01	8,121 23	2,972 60
Prince Edward Island	1,099 92	60 00	.....	.....	282 55	26 88	1,469 35	636 45
Manitoba	9,024 68	.....	.....	1,299 96	5,028 93	246 79	15,600 36	12,471 30
Saskatchewan	11,724 57	2,119 00	.....	180 00	12,047 48	419 97	26,491 02	19,065 40
Alberta	6,799 80	798 33	.....	600 00	5,541 40	360 47	14,100 00	10,923 00
British Columbia	4,616 47	74 00	.....	180 00	2,687 55	562,58	8,120 60	3,701 15
Yukon	999 96	.....	.....	.....	.....	.....	999 96	6 30
Chief Inspector	.....	.....	.....	.....	.....	90 71	90 71	.....
Inspectors of Elevator Scales	636 98	.....	.....	.....	180 55	.....	817 53	.....
	499 92	.....	.....	.....	73 50	.....	573 42	.....
Total for Divisions	124,386 87	13,277 35	6 60	6,093 98	50,253 63	4,020 39	198,038 82	139,825 05
Milk Test Glassware	.....	.....	.....	.....	.....	.....	.....	1,564 35
General Contingencies	.....	.....	.....	.....	.....	2,211 50	2,211 50	.....
Printing	.....	.....	.....	.....	.....	4,639 63	4,639 63	.....
Stationery	.....	.....	.....	.....	.....	464 09	464 09	
Provisional Allowance	.....	.....	.....	.....	.....	5,487 50	5,487 50	.....
International Bureau of Weights and Measures	.....	.....	.....	.....	.....	218 85	218 85	.....
Grand totals	124,386 87	13,277 35	6 60	6,093 98	50,253 63	17,041 96	211,060 39	141,389 40

APPENDIX B.

RETURN showing the Number of Weights, Measures, and Weighing Machines verified during the Fiscal Year ended March 31, 1918.

Inspection Divisions.	Weighing Machines.																Weights.				
			Platform Scales.				Spring Scales.			Computing Scales.		Automatic Scales.									
	Equal Arms.	Steelyard.	Ordinary.	Pitless.	Dial.	Track.	Trade.	Ice and Dairy.	Automatic Slot.	Spring.	All others.	Grain Elevator.	All others.	Suspension Scales.	Combined Avdp and Metric.	Metric.	Avoirdupois.	Troy.	Metric.	Tolerated.	Tobacco.
Ontario	6,628	4,473	30,161	125	290	114	228	204	100	2,298	6,631	25	40	37	.....	106	27,665	101	48	.....	.....
Quebec	4,533	4,144	16,452	185	21	72	291	39	202	626	2,226	20	78	13	6	15	26,516	33	72	82	312
New Brunswick	406	43	933	.....	1	13	58	.....	.....	38	263	.....	.....	.....	.....	.....	1,867	.....	.....	.....	.....
Nova Scotia	443	19	1,250	.....	1	43	68	.....	.....	70	387	.....	4	8	2	.....	2,320	.....	.....	1	.....
Prince Edward Island	136	12	411	2	.....	1	13	.....	.....	9	38	.....	2	5	.....	1	616	.....	.....	.....	.....
Manitoba	537	604	3,153	73	11	29	82	6	29	1,119	511	26	3	1	.....	48	3,503	.....	49	.....	.....
Saskatchewan	241	1,337	6,198	178	1	13	27	12	2	623	383	31	10	10	.....	2	1,593	.....	4	.....	.....
Alberta	275	206	2,684	139	.....	42	13	15	2	186	663	112	3	.....	.....	208	2,675	.....	44	.....	.....
British Columbia	382	221	1,689	11	1	39	262	52	6	571	463	6	5	.....	.....	3	1,645	.....	11	.....	.....
Yukon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	29	.....	.....	.....
Totals	13,581	11,059	62,931	713	326	366	1,042	328	341	5,540	11,565	220	145	74	8	383	68,404	163	228	83	312

APPENDIX B—*Continued.*

RETURN showing the Number of Weights, Measures, and Weighing Machines rejected during the Fiscal Year ended March 31, 1918.

Inspection Divisions.	Weighing Machines.																Weights.				
			Platform Scales.				Spring Scales.			Computing Scales.		Automatic Scales.									
	Equal Arms.	Steelyard.	Ordinary.	Pitless.	Dial.	Track.	Trade.	Ice and Dairy.	Automatic Slot.	Spring.	Allothers.	Grain Elevator.	Allothers.	Suspension Scales.	Combined Avdp and Metric.	Metric.	Avoirdupois.	Troy.	Metric.	Tolerated.	Tobacco.
Ontario	235	92	1,138	12	32	15	23	1	27	78	353	.....	37	2	.....	.....	168	.....	.....	.....	.....
Quebec	65	27	435	8	.....	9	15	.....	3	26	111	9	3	.....	.....	.....	242	.....	.....	.....	.....
New Brunswick	2	24	.....	.....	.....	1	1	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nova Scotia	4	.....	18	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Prince Edward Island	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10	.....	.....	.....	.....
Manitoba	23	46	165	.....	3	1	6	.....	7	166	25	1	.....	1	.....	.....	.....	.....	.....	.....	.....
Saskatchewan	4	10	435	32	2	3	3	.....	1	20	23	.....	2	3	.....	.....	.....	.....	.....	.....	.....
Alberta	13	10	259	27	.....	10	.....	.....	.....	9	35	4	1	.....	.....	1	17	.....	.....	.....	.....
British Columbia	.....	.....	31	.....	.....	1	.....	.....	.....	2	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yukon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals	346	185	2,505	79	37	42	49	1	38	302	553	14	43	6	.....	1	437	.....	.....	.....	.....

APPENDIX B—*Concluded.*

RETURN showing the Number of Weights, Measures, and Weighing Machines submitted during the Fiscal Year ended March 31, 1918.

Inspection Divisions.	Weighing Machines.																Weights.				
			Platform Scales.				Spring Scales.			Computing Scales.		Automatic Scales.									
	Equal Arms.	Steelyard.	Ordinary.	Pitless.	Dial.	Track.	Trade.	Ice and Dairy.	Automatic Slot.	Spring.	All others.	Grain Elevator.	All others.	Suspension Scales.	Combined Avdp and Metric.	Metric.	Avoirdupois.	Troy.	Metric.	Tolerated.	Tobacco.
Ontario	6,863	4,565	31,299	137	322	129	251	205	127	2,376	6,984	25	77	39	.....	106	27,833	101	48	.....	.....
Quebec	4,598	4,171	16,887	193	21	81	306	39	205	652	2,337	29	81	13	6	15	26,758	33	72	82	312
New Brunswick	408	43	957	.....	1	14	59	.....	.....	39	264	.....	.....	.....	.....	.....	1,867	.....	.....	.....	.....
Nova Scotia	447	19	1,268	.....	1	44	69	.....	.....	70	387	.....	4	8	2	.....	2,330	.....	.....	1	.....
Prince Edward Island	136	12	411	2	.....	2	13	.....	.....	9	38	.....	2	5	.....	1	616	.....	.....	.....	.....
Manitoba	560	650	3,318	73	14	30	88	6	36	1,285	536	27	3	2	.....	48	3,503	.....	49	.....	.....
Saskatchewan	245	1,347	6,633	210	3	16	30	12	3	643	406	31	12	13	.....	2	1,593	.....	4	.....	.....
Alberta	288	216	2,943	166	.....	52	13	15	2	195	698	116	4	.....	.....	209	2,692	.....	44	.....	.....
British Columbia	382	221	1,720	11	1	40	262	52	6	573	468	6	5	.....	.....	3	1,645	.....	11	.....	.....
Yukon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	29	.....	.....	.....
Total	13,927	11,244	65,436	792	363	408	1,091	329	379	5,842	12,118	234	188	80	8	384	68,841	163	228	83	312
Yukon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

APPENDIX C.

RETURN showing the Number of Measures of Capacity, Lineal Measures, and Miscellaneous Verified during the Fiscal Year ended March 31, 1918.

Inspection Division.	Measures of Capacity.		Measuring Devices.		Lineal Measures.		Miscellaneous.			
	Dominion.	Milk Cans.	Pumps.	Measuring Tanks.	Dominion.	Metric.	Moisture Test Scales.	Druggist Scales.	Salt Carts.	Miners' Attachments.
Ontario	80,938	40,188	4,135	.....	5,155	95	25	.....	.....	.....
Quebec	35,212	6,168	1,073	6	1,826	.....	.....	5	.....	.....
Nova Scotia	1,236	.....	399	3	34	.....	.....	.....	61	16
Prince Edward Island	52	.....	73	.....	.....	.....	.....	.....	.....	.....
Manitoba	6,779	9,922	544	1	789	.....	.....	.....	.....	.....
Saskatchewan	238	1,698	253	.....	184	.....	.....	.....	.....	.....
Alberta	169	3,702	398	7	.....	.....	.....	.....	.....	8
British Columbia	85	.....	51	.....	28	21	.....	.....	.....	12
Yukon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals	127,146	64,075	7,114	44	8,024	116	25	5	61	36

RETURN showing the Number of Measures of Capacity, Lineal Measures, and Miscellaneous Rejected during the Fiscal Year ended March 31, 1918.

Inspection Division.	Measures of Capacity.		Measuring Devices.		Lineal Measures.	Miscellaneous.
	Dominion.	Milk Cans.	Pumps.	Measuring Tanks.	Dominion.	Miners' Attachments.
Ontario	15	8	34	.....	57	.....
Quebec	6	2	33	.....	.....	.....
Nova Scotia	24	.....	.....	.....	.....	3
Prince Edward Island	.....	.....	.....	.....	.....	.....
Manitoba	.....	.....	17	.....	5	.....
Saskatchewan	1	.....	17	1	.....	.....
Alberta	.....	.....	18	.....	.....	.....
British Columbia	.....	.....	.....	.....	.....	.....
Yukon	.....	.....	.....	.....	.....	.....
Totals	46	10	119	1	62	3

APPENDIX C—*Concluded.*

Provinces.	Measures of Capacity.		Measuring Devices.		Lineal Measures.		Miscellaneous.			
	Dominion.	Milk Cans.	Pumps.	Measuring Tanks.	Dominion.	Metric.	Moisture Test Scales.	Druggist Scales.	Salt Carts.	Miners' Attachments.
Ontario	81,121	40,196	4,169	.....	5,212	95	25	.....	.....	.....
Quebec	35,218	6,170	1,106	6	1,826	.....	.....	5	.....	.....
New Brunswick	2,435	2,397	188	27	8	.....	.....	.....	.....	.....
Nova Scotia	1,260	.....	399	3	34	.....	.....	.....	61	19
P. E. Island	52	.....	73	.....	.....	.....	.....	.....	.....	.....
Manitoba	6,779	9,922	561	1	794	.....	.....	.....	.....	.....
Saskatchewan	239	1,698	270	1	184	.....	.....	.....	.....	.....
Alberta	3	3,702	416	7	.....	.....	.....	.....	.....	8
British Columbia	85	.....	51	28	21	.....	.....	.....	.....	12
Yukon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals	127,192	64,085	7,233	45	8,086	116	25	5	61	39

APPENDIX D.

STATEMENT of Gas Inspection Expenditures and Revenues for the Fiscal Year ended March 31, 1918.

	Expenditures.						Revenues.
	Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	Total.	
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Ontario	27,902 99	3,418 69	844 95	1,633 50	474 24	34,274 37	31,274 95
Quebec	12,088 57	.....	432 00	126 30	110 42	12,757 29	15,678 35
New Brunswick	2,699 88	.....	.....	313 60	25 20	3,038 68	734 60
Nova Scotia	2,599 92	.....	253 68	.....	.....	2,853 60	396 90
P. E. Island	499 92	.....	.....	.....	.....	499 92	.....
Manitoba	6,784 17	.....	.....	.....	.....	6,784 17	2,649 40
Alberta	.....	546 65	.....	89 50	106 55	742 70	1,761 50
British Columbia	1,499 88	.....	.....	.....	30 75	1,530 63	3,823 35
Chief Inspector	.....	.....	.....	.....	10 00	10 00	.....
Inspector Western Dominion	.....	.....	.....	.....	137 75	137 75	.....
Total for Districts	54,075 33	3,965 34	1,530 63	2,162 90	894 91	62,629 11	56,319 05
General Contingencies	.....	.....	.....	.....	137 21	137 21	.....
Printing	.....	.....	.....	.....	2,593 74	2,593 74	.....
Stationery	.....	.....	.....	.....	1,634 60	1,634 60	.....
Grand totals	54,075 33	3,965 34	1,530 63	2,162 90	5,260 46	66,994 66	56,319 05

APPEN

Coal and Water Gas Companies

Place and Company.	Kind of Gas.	Meters.	Sulphuretted Hydrogen (No trace	
			Number of Tests.	
			Prescribed.	Made.
Barrie, Ont.: Barrie Gas Company	Car. Water Gas	630	24	24
Belleville, Ont.: Corporation of Belleville	C.W.G. and Coal Gas	1,528	48	48
Brandon, Man.: Brandon Gas & Power Co.	Coal Gas	1,110		Testing
Brockville, Ont.: Corporation of Brockville	Car. Water Gas	1,796	48	48
Cobourg, Ont.: Hydro-El. Pr. Com. of Ont.	Coal Gas	457	24	24
Cornwall, Ont.: Stormont El. Lt. & Pr. Co.	Car. Water Gas	375	24	24
Deseronto, Ont.: Corporation of Deseronto	Car. Water Gas	125	24	24
Guelph, Ont.: Corporation of Guelph	C.W. G. and Coal Gas	3,350	96	96
Halifax, N.S.: Nova Scotia Tram. & Pr. Co.	Coal Gas	1,710	48	48
Hamilton, Ont.: United Gas & Fuel Co.	C.W.G. and Coal Gas	750	24	24
Kingston, Ont.: Corporation of Kingston	Car. Water Gas	3,124	96	96
Kitchener, Ont.: Corporation of Kitchener	C.W.G. and Coal Gas	3,323	96	96
London, Ont.: City Gas Company	C.W.G. and Coal Gas	10,340	144	144
Montreal, P.Q.: Montreal Lt. Ht. & Pr. Co.	C.W.G. and Coal Gas	112,013	302	302
Nanaimo, B.C.: Nanaimo Gas & Power Co.	Coal Gas	300	24	24
Napanee, Ont.: Hydro-Elect. Pr. Com. of Ont.	Coal Gas	346	24	24
Nelson, B.C.: Corporation of Nelson	Coal Gas	488		Testing
New Westminster, B.C.: Corp. of N. W.	Coal Gas	276	24	24
Oshawa, Ont.: Hydro-Elect. Pr. Com. of Ont.	Car. Water Gas	1,307	48	48
Ottawa, Ont.: Ottawa Gas Co.	Coal Gas	14,647	298	296
Owen Sound, Ont.: Corp. of Owen Sound	C.W.G. and Coal Gas	1,139	48	48
Peterboro, Ont.: Hydro-El. Pr. Com. of Ont.	Car. Water Gas	2,550	96	76
Port Hope, Ont.: Port Hope Gas Co.	Coal Gas	410	24	24
Quebec, P.Q.: Quebec Ry. Lt. Ht. & Pr. Co.	Car. Water Gas	6,439	144	144
St. Hyacinthe, P.Q.: La Cie de Gaz, El. et Pr.	Car. Water Gas	531	24	24
St. John, N.B., New Brunswick Power Co.	Coal Gas	1,739	48	48
St. Thomas, Ont.: Corp. of St. Thomas	Coal Gas	3,290	96	96
Sherbrooke, P.Q., Corp. of Sherbrooke	Car. Water Gas	1,193	24	39
Sorel, P.Q.: Corporation of Sorel	Coal Gas	300		Testing
Stratford, Ont.: Stratford Gas Co.	C.W.G. and Coal Gas	1,355	48	48
Toronto, Ont.: Consumers Gas Co.	C.W.G. and Coal Gas	109,650	301	301
Vancouver, B.C.: Vancouver Gas Co.	C.W.G. and Coal Gas	14,507	301	301
Victoria, B.C.: Victoria Gas Co.	Coal Gas	3,782	96	96
Waterloo, Ont.: Corporation of Waterloo	Car. Water Gas	795	24	24
Winnipeg, Man.: Winnipeg El. Ry. Co.	Coal Gas	19,283	302	276
Yarmouth, N.S.: Yarmouth Fuel Gas Co.	Coal Gas	291	16	16

DIX E.

Registered and Gas Tests made.

Tests. permitted.)	Calorimetric Tests (Standard: 520 British Thermal Units).					
Times found present.	Number of Tests.		B.T.U. Values Found.			Readings below Standard.
	Prescribed.	Made.	Highest.	Lowest.	Average.	
0	24	24	608	534	570	None.
0	48	61	593	497	532	509, 519, 497, 498, 503, 518, 515, 519
apparatus	not yet instal	led.				
0	48	48	611	532	578	None.
0	24	24	630	532	588	"
13	24	24	658	523	563	"
13	24	25	832	469	638	499, 469
0	96	96	622	542	576	None.
0	48	48	569	501	538	501
0	24	24	539	521	528	None.
0	96	96	689	528	631	"
0	96	96	578	520	533	"
0	144	144	607	520	552	"
0	302	302	560	520	522	"
1	24	24	631	525	559	"
0	24	24	603	480	537	505, 480, 498, 502, 483
apparatus	not yet instal	led.				
0	24	24	699	579	637	None.
7	48	48	640	522	576	"
0	298	296	589	521	549	"
0	48	48	580	520	548	"
14	96	76	573	532	556	"
0	24	24	677	583	643	"
0	144	144	594	539	568	"
0	24	24	551	520	528	"
1	48	48	622	551	586	"
0	96	96	725	539	626	"
0	24	41	655	529	585	"
apparatus	not yet instal	led.				
0	48	48	655	505	580	505, 513
0	301	301	557	512	535	512
35	301	301	568	500	533	515, 516, 517, 515, 515, 500, 513, 510, 512, 518, 518, 508, 510
0	96	96	562	511	535	511, 517, 515
1	24	24	644	525	561	None.
2	302	302	586	463	540	463, 515
2	16	16	670	539	592	None.

APPENDIX F.

Statement of Gas Meters tested.

District.	Verified as with Legal Limits.			Rejected.	
	Correct.	Not over 2% fast.	Not over 3% slow.	Over 2% fast	Over 3% slow
Belleville	492	243	1,069	29	64
Calgary	208	145	2,180	10	5
Halifax	218	46	79	1	1
Hamilton	2,537	580	3,200	.....	.....
London	2,204	1,088	4,357	8	20
Montreal	7,023	5,062	9,567	229	239
Ottawa	611	535	1,065	2	.....
Quebec	316	49	271	.....	.....
St. Hyacinthe	7	10	24	.....	1
St. John	539	59	224	1	.....
Sherbrooke	226	84	211	.....	.....
Toronto	11,280	2,390	8,830	129	164
Vancouver	1,023	1,368	1,078	72	17
Victoria	207	222	241	.....	.....
Winnipeg	1,511	461	1,017	6	11
Totals	28,402	12,342	33,413	487	522

Total verified	74,157
Total rejected	1,009
Total tested	75,166

APPENDIX G.

Statement of Natural Gas Companies Registered.

Location.	Name.	Number of Meters.
Aylmer, Ont.	Central Pipe Line Co.	841
Belmont, Ont.	Belmont Gas Light Co.	118
Blenheim, Ont.	Union Natural Gas Co. of Canada	552
Brantford, Ont.	Brantford Gas Co.	5,566
Brantford (Echo Place), Ont.	Dominion Natural Gas Co.	124
Bridgeburg, Ont., and vicinity.	Provincial Natural Gas & Fuel Co.	1,613
Brooks, Alta.	Canadian Western Nat. Gas, Light, Heat & Power Co.	74
Caledonia, Ont.	Port Colborne-Welland Natural Gas & Oil Co.	458
Calgary, Alta.	Calgary Gas Co.	8,068
Castor, Alta.	Corporation of Castor	41
Cayuga, Ont., and vicinity.	Dominion Natural Gas Co.	422
Chatham, Ont.	Chatham Gas Co.	3,496
Claresholm, Alta.	Canadian Western Nat. Gas, Light, Heat & Power Co.	203
Delhi, Ont.	Dominion Natural Gas Co.	235
Dorchester, Ont.	Southern Ontario Gas Co.	104
Dresden, Ont.	Union Natural Gas Co. of Canada	436
Dundas, Ont., and vicinity.	Dominion Natural Gas Co.	2,357
Dunnville, Ont.	Dominion Natural Gas Co.	922
Dutton, Ont.	Southern Ontario Gas Co.	239
Fenwick, Ont.	United Gas Companies	41
Fingal, Ont.	Southern Ontario Gas Co.	66
Ford City, Ont.	Windsor Gas Co.	434
Fort Erie, Ont.	Lake Shore Natural Gas Co.	266
Galt, Ont.	Dominion Natural Gas Co.	1,881
Granum, Alta.	Canadian Western Nat. Gas, Light, Heat & Power Co.	120
Haldimand County, Ont.	Midfield Natural Gas Co.	38
Hamilton, Ont., and vicinity.	Manufacturers Natural Gas Co.	205
Hamilton, Ont.	United Gas and Fuel Co.	18,629
Hagersville, Ont.	Manufacturers Natural Gas Co.	151
Highgate, Ont.	Southern Ontario Gas Co.	120
Hillsboro, N.B.	Moncton Tramways Electricity & Gas Co.	334
Humberstone, Ont., and vicinity	Sterling Gas Co.	296
Ingersoll, Ont.	Ingersoll Gas Light Co.	1,256
Jarvis, Ont.	Dominion Natural Gas Co.	212
Kingsville, Ont.	Beaver Oil & Gas Co.	596
Lambeth, Ont.	Southern Ontario Gas Co.	82
Leamington, Ont.	Beaver Oil and Gas Co.	348
Leamington, Ont.	Corporation of Leamington	255
Lethbridge, Alta.	Canadian Western Nat. Gas, Light, Heat & Power Co.	760
Lyndoch, Ont.	Dominion Natural Gas Co.	36
MacLeod, Alta.	Canadian Western Nat. Gas, Light, Heat & Power Co.	212
Medicine Hat, Alta.	Corporation of Medicine Hat	2,750
Moncton, N.B.	Moncton Tramways Electricity & Gas Co.	2,992
Nanton, Alta.	Canadian Western Nat. Gas, Light, Heat & Power Co.	152
Niagara Falls, Ont.	Provincial Natural Gas & Fuel Co.	3,230
Okotoks, Alta.	Canadian Western Nat. Gas, Light, Heat & Power Co.	83
Paris, Ont.	Dominion Natural Gas Co.	555
Petrolia, Ont.	Petrolia Utilities Co.	838
Port Burwell, Ont.	Central Pipe Line Co.	107
Port Colborne, Ont.	Sterling Gas Co.	692
Port Colborne, Ont.	Welland County Lime Works	72
Port Dover, Ont.	Dominion Natural Gas Co.	422
Port Rowan, Ont.	Dominion Natural Gas Co.	227
Port Royal, Ont.	Dominion Natural Gas Co.	41
Putnam, Ont.	Southern Ontario Gas Co.	15
Ridgetown, Ont.	Union Natural Gas Co. of Canada	601
Ridgeway, Ont.	Bertie Natural Gas Co.	139
Rodney, Ont., and vicinity.	Southern Ontario Gas Co.	209
Rosehill, Ont.	Rosehill Natural Gas Co.	39
St. Catharines, Ont.	Corporation of St. Catharines	550
St. Catharines, Ont.	United Gas Companies	2,686
St. George, Ont.	Dominion Natural Gas Co.	115
St. Williams, Ont.	Dominion Natural Gas Co.	76
Sandwich, Ont., and vicinity.	Windsor Gas Co.	555
Sarnia, Ont.	Sarnia Gas Co.	3,619

APPENDIX G—*Concluded.*

STATEMENT of Natural Gas Companies—*Concluded.*

Location.	Name.	Number of Meters.
Selkirk, Ont., and vicinity	Dominion Natural Gas Co	602
Shedden, Ont	Southern Ontario Gas Co	73
Simcoe, Ont	Dominion Natural Gas Co	1,541
Suffield, Alta	Southern Alberta Gas Co	25
Thorold, Ont	United Gas Companies	724
Vienna, Ont	Central Pipe Line Co	72
Vittoria, Ont	Dominion Natural Gas Co	63
Walkerville, Ont	Windsor Gas Co	1,351
Wallacetown, Ont	Southern Ontario Gas Co	52
Welland, Ont	Provincial Natural Gas and Fuel Co	2,420
Welland County, Ont	Industrial Natural Gas Co	65
Welland County, Ont	Wainfleet and Moulton Gas Co	18
West Lorne, Ont	Southern Ontario Gas Co	164
Wheatley, Ont	Beaver Oil and Gas Co	272
Windsor, Ont	Windsor Gas Co	6,275
Woodstock, Ont	Woodstock Gas Light Co	2,159
	Total	88,848

APPENDIX H.

STATEMENT of Electricity Expenditures and Revenues for the Fiscal Year ended March 31, 1918.

Districts.	Expenditures.						Revenues.
	Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	Total.	
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Ontario	4,433 12	1,064 96	20 00	2,908 81	343 30	8,770 19	33,264 15
Quebec	499 92	3,239 88	780 00	1,127 74	236 99	5,884 53	17,395 80
New Brunswick	.....	.....	.....	278 56	41 10	319 16	2,201 45
Nova Scotia	.....	922 50	.....	883 73	239 21	2,045 44	2,582 05
Prince Edward Island	.....	60 00	.....	31 75	11 51	103 26	335 85
Manitoba	.....	.....	516 00	201 90	118 42	836 32	7,797 30
Saskatchewan	2,064 51	127 67	.....	1,015 85	127 81	3,335 84	1,982 75
Alberta	3,000 00	771 41	.....	626 00	292 67	4,690 08	5,227 90
British Columbia	7,085 54	972 99	.....	617 92	299 03	8,957 48	8,733 10
Yukon	499 92	.....	.....	.....	.....	499 92	.....
Chief Electrical Engineer	.....	.....	.....	.....	296 31	296 31	.....
Inspector of Eastern Division	2 70	.....	.....	.....	.....	2 70	.....
Inspector Western Division	2,599 92	.....	.....	404 20	283 74	3,287 86	.....
Total for Districts	20,185 63	7,159 41	1,316 00	8,096 46	2,290 09	39,047 59	79,520 35
General Contingencies	.....	.....	.....	.....	1,384 20	1,384 20	.....
Printing	.....	.....	.....	.....	2 74	2 74	.....
Stationery	.....	.....	.....	.....	7 24	7 24	.....
International Electro-Technical Commission	.....	.....	.....	.....	400 00	400 00	.....
Provisional Allowance	.....	.....	.....	.....	2,789 53	2,789 53	.....
Export of Electric Power	.....	.....	.....	.....	869 58	869 58	.....
Grand totals	20,185 63	7,159 41	1,316 00	8,096 46	7,743 38	44,500 88	79,520 35

APPENDIX I.

Statement of Electric Meters Tested.

District.	Verified as Within Legal Limits.			Rejected.	
	Correct.	Not over 3% Fast.	Not over 3% Slow.	Over 3% Fast.	Over 3% Slow.
Belleville	834	2,191	559	.....	.....
Calgary	2,521	2,251	603	8	7
Charlottetown	253	175	130	.....	.....
Edmonton	1,152	1,801	184	.....	.....
Fort William	130	800	253	5	.....
Halifax	2,182	1,427	615	4	6
Hamilton	8,360	1,351	2,099	.....	.....
London	3,403	2,724	1,236	1	2
Montreal	3,173	14,965	3,411	1	1
Ottawa	1,906	4,910	1,498	.....	.....
Quebec	1,771	677	286	.....	.....
Regina	852	1,902	511	2	.....
St. Hyacinthe	467	854	100	1	.....
St. John	1,669	965	968	9	5
Sherbrooke	196	1,259	112	.....	.....
Sudbury	654	953	552	1	4
Toronto	9,108	6,148	2,518	42	105
Three Rivers	875	46	46	3	4
Vancouver	3,844	5,777	1,188	5	1
Victoria	1,765	887	752	.....	1
Winnipeg	3,994	7,845	533	.....	4
Yukon	.....	.....	.....	.....	.....
Totals	49,109	59,908	18,154	82	140

Total verified	127,171
Total rejected	222
Total tested	127,393

APPENDIX J.

STATEMENT showing amount of Electrical Energy generated or produced for export and for consumption in Canada, under the Electricity and Fluid Exportation Act.

Name of Contractor.	Units produced for Export.		Units produced for use in Canada.		Total Output of Generating Station or Other Source.	
	K.W. Hours.	H.P. Years.	K.W. Hours.	H.P. Years.	K.W. Hours.	H.P. Years.
Canadian Niagara Power Co.	256,005,960	39,174·84	338,011,040	51,723·51	594,017,000	90,898·35
Electrical Development Co.	138,062,000	21,126·58	660,172,800	101,021·70	798,234,800	122,148·28
Ontario Power Co.	321,768,400	49,238·00	654,412,500	100,140·27	976,180,900	149,378·27
*International Railway Co.	.....	.....	.....	.....	.....	.....
Ontario and Minnesota Power Co.	14,225,610	2,176·84	11,354,710	1,737·51	25,580,320	3,914·35
Cedar Rapids Power Co.	380,635,000	58,245·97	187,916,000	28,755·49	568,551,000	87,001·46
Sherbrooke Railway & Power Co.	118,791	18·16	4,270,826	653·44	4,389,617	671·60
Maine & New Brunswick Power Co.	4,190,996	641·22	251,104	38·42	4,442,100	679·64
Western Canada Power Co.	14,242,756	2,179·45	72,014,814	11,019·91	86,267,570	13,199·36
British Columbia Electric Railway Co.	327,832	50·18	76,419,718	11,693·97	76,737,550	11,744·15
West Kootenay Power & Light Co.	.....	.....	47,326,500	7,242·06	47,326,500	7,242·06
Totals	1,129,577,345	172,851·24	2,052,150,012	314,026·28	31,181,727,357	486,877·52

*This Company's License is for 100 K.W., the varying load being used for electric railway supply, chiefly on the Canadian side of the boundary.

APPENDIX K.

List of Electric Light and Power Companies Registered under the Provisions of the Electricity Inspection Act, during the Fiscal Year ended March 31, 1918.

District and Company.	Address.	Prime Mover.		Phases of System.	Frequency of System.	Generator Voltage.	Service Voltage.		Number of Meters	
		Type.	Horse Power.				Power.	Lighting.	Power.	Lighting.
Belleville—										
Benjamin Wheel Co., Ltd	Yarker	Water	40	DC.		125		125		
Bobcaygeon Electric Lt. Com	Bobcaygeon	Water	200	3	60	2,200		110		
Board of Water, Lt. & Pr. Com	Fenelon Falls	Water	600	3	60	550	550	110		
Brockville Public Utilities Com	Brockville	Steam	1,030	3	60	2,200	220/550	110	34	1,370
Campbellford Water & Lt. Com	Campbellford	Water	3,450	3	60	2,400	110/2200	110	2	4
Cardinal Electric Lt. Co	Cardinal	Steam	550	3	60	240	220	110		50
Civic Utilities Commission	Kingston	Steam & Hydro	1,700	3	60	2,300 & 44,000	550	110/220	86	2,359
Fair and Mullett	Bancroft	Water	75	DC.		125		125		
Fowlds Company Limited	Hastings	Water	100	2	60	2,200	110	110		4
Frankford Electric Light Co., Ltd	Frankford			3			2,200	220	110	80
Gananoque Electric Lt. & Water Supply Co., Ltd	Gananoque	Water & Steam.	1,400	3	60	250/2,400	550	120	37	478
Goodrich, J. H	Warkworth	Water	80	2	60	2,200		110		
Harrison, W. C	Norwood		75	1		1,000		110		
Hydro Electric Pr. Com. of Ontario	Bowmanville	Hydro		3	60	44,000	550/220	220/110	10	650
Hydro Electric Pr. Com. of Ontario	Brighton	"		3	60	44,000	550/220	220/110	60	350
Hydro Electric Power Commission	Belleville	Hydro		3	60	2,200	120,550	120/240	70	1,965
Hydro-Electric Pr. Com. of Ontario	Cobourg	"		3	60		220/2,200	110/220	27	672
Hydro-Electric Pr. Com. of Ontario	Deseronto	"		3	60		550/220	110/220	9	171
Hydro-Electric Pr. Com. of Ontario	Lindsay	"	1,500	3	60	550	1,040/220	110	27	1,500
Hydro-Electric Pr. Com. of Ontario	Napanee	"		3	60		550/220	110/220	12	553
Hydro-Electric Pr. Com. of Ontario	Newcastle	"		3	60	44,000	220	110	3	142
Hydro-Electric Pr. Com. of Ontario	Millbrook	"		3	60		110/220	110	1	150
Hydro-Electric Power System	Omemee		37½				4,160	110	3	65
Hydro-Electric Pr. Com. of Ontario	Orono	Hydro		3	60	44,000	220	110	3	125
Hydro-Electric Pr. Com. of Ontario	Oshawa	"		3	60	4,200	550	110	52	1,567
Hydro-Electric Pr. Com. of Ontario	Port Hope	"		3	60		110/550	110/220	27	835
Hydro-Electric Pr. Com. of Ontario	Trenton	"		3	60		220/6,600	110/220	83	1,000
Hydro-Electric Pr. Com. of Ontario	Tweed	"		3	60		550	110	5	
Kemptville Milling Co	Kemptville		300	3	60	10,000	220	110		25

Lakefield Electric Lt. Co.	Lakefield	Water	125	3	60	2,200	550	110		
Madoc, the Village of	Madoc			3	60		220	220		
Marmora Electric Lt. Plant	Marmora	Turbine	100	1	125	1,040		104		
Niles, W. P., Limited	Wellington	Gas	65			500	500	250	1	1
Peterborough Utilities Commission	Peterborough	Hydro					220/2,200	220/110	4	656
Picton Public Utilities	Picton	Steam	375	2	60	2,200	110/220	110	10	640
Prescott Water & Lt. Com	Prescott	Hydro				2,200	220	110	16	602
Rideau Power Co., Ltd	Merrickville	Water	750	3	60	600	600	110		100
Stirling Electric Dept	Stirling	Purchased		1		44,000/ 2,400	240	120/240		3
Westport Electric Lt. & Milling Co.	Westport	Water	290	3	60	2,200		110		
Fort William, Ont.—										
Dryden Electrical Dept	Dryden			3	60	600	550	110	4	123
Dryden Timber & Pr. Co., Ltd	Dryden	Turbine	2,000	3		600	600	110		
Fort Frances, Town of	Fort Frances	Purchased								
Fort William Electric Lt. Dept	Fort William	Purchased					220/550	112	44	4,340
Kaministiquia Power Co., Ltd	Fort William	Water	25,000	3	60	3,600/ 4,400	550/25,000	110/220		
Kenora, Corporation of town of	Kenora	Water	3,296	3	60	2,400	2,200	110/220	13	500
Langstaff, Schurg & Co	Emo	Steam	75	DC.		110		110		
McMahon, Harry C	Mine Centre	Oil	6	DC.		60–80		50		2
McIrvine Municipality	Fort Frances	Water			60	6,600	2,200	110		8
Ontario & Minnesota Pr. Co., Ltd	Fort Frances	Water	6,000	3	60	6,600	220	110		
Port Arthur Public Utilities Com	Port Arthur	Water	1,925	3	60	550/2,200	10/22,000	220/110	42	3,296
Rainy River Electric Lt. & Pr. Co.	Rainy River	Steam	2–150–300	3	60	2,200	110	110		185
Hamilton, Ont.—										
Acton, Corporation of	Acton	Purchased	225		25		550	110	8	270
Ayr Hydro-Electric System	Ayr	Hydro					220	110	2	124
Battle, James	Thorold	Purchased	2,700	3	25	2,000	12,000	110	4	
Brantford Hydro-Electric System	Brantford	Hydro	2,690	3	25		550/220	220/110	40	2,900
Caledonia Hydro-Electric System	Caledonia	Hydro					550/110	110	6	80
Canadian Niagara Power Co	Niagara Falls	Water	100,000	3	25	11,000	220/11,000	110	65	374
Davies, D	Waterdown		50			2,200	220/550	110	4	137
Dunnville Hydro-Electric System	Dunnville	Hydro	125	3		2,200		104		120
Dundas Electric Company, Ltd	Dundas	Purchased		3	66	2,400	220	112	5	86
Delhi Lt. & Pr. Company, Ltd	Delhi	Turbine	295	3	60	2,300	110/2,200	110	6	115
Elmira Public Utilities Com	Elmira	Hydro		3	25				13	230
Green, A. E	St. George	Hydro		1 & 3		4,000	550	110	3	80
Grantham Tnp. Hydro-Elec. System	St. Catharines	Hydro				2,200	220	110/220		130
Hamilton Cataract Pr. Lt. & Traction Co., Ltd	Grimsby	Water	46,200	3	66	2,400	220	112	25	562
" " "	Beamsville	Water	46,200	3	66	2,400	220	112	6	269
" " "	Burlington	Water	46,200	3	66	2,400	220	112	20	747
" " "	Hamilton	Water & Steam	46,200	3	66	2,400	2,400/220	112	410	60
" " "	Hamilton	Water		3	66	2,400	220/110	112	60	4,000
" " "	Hamilton	Water		3	66	2,400		112		10
Hydro-Electric Commission	Galt	Hydro	2,550			6,600	550	110/220	83	2,818
" "	Georgetown	Hydro		3	25	12,000	220/550	110	10	480

APPENDIX K.

List of Electric Light and Power Companies Registered under the Provisions of the Electricity Inspection Act—*Continued.*

District and Company.	Address.	Prime Mover.		Phases of System.	Frequency of System.	Generator Voltage.	Service Voltages.		Number of Meters.	
		Type.	Horse Power.				Power.	Lighting.	Power.	Lighting.
Hamilton, Ont.—Con.										
Hydro-Electric Commission	Hespeler	Hydro		3	25	66,000	220/550	110	13	350
" "	Hagersville	Hydro				13,000	2,200	110	4	2,000
" "	Hamilton	Hydro		3	25		220/2,200	110/220	518	15,812
" "	Milton	Hydro		3			220/2,200	110/220	5	260
" "	Niagara Falls	Hydro					220/2,200	110	56	2,690
" "	Paris	Hydro	800			2,200	550/2,200	110	5	750
" "	Simcoe	Hydro	300	3		4,400	550/220	110	15	163
" "	Welland	Hydro					220/46,000	110	30	700
Kitchener Light Commissioners	Kitchener	Hydro	6,000	3	25 & 60	13,200	530/2,200	110	157	3,304
Lincoln Electric Lt. & Pr. Company	St. Catharines						220	110	115	950
Merritton Municipal Elec. Lt. & Pr. Plant	Merritton						110/550	110/220	1	446
New Hamburg Municipal Electric Dept	New Hamburg	Hydro	300			2,200	550	110	6	253
Niagara Elec. Lt. & Pr. Plant	Niagara						220	110		315
Oakville Water & Light Com	Oakville			3	60		2,200	110	14	665
Ontario Pr. Co. of Niagara Falls	Niagara Falls	Water	160,000	3	25	12,000	12,000/ 60,000		25	
Police Village of Baden	Baden	Hydro		3	25		2,200/550	220/110	5	80
Public Utilities Commission	Dundas	Water		3	25	13,200	220/550	110	45	1,024
Preston Lt. & Water Commission	Preston	Purchased	1,340	3	25	2,200	550	110	33	1,029
Smithville Municipal Lt. & Power	Smithville	Purchased		3	60	2,200	220	110	5	102
St. Catharines Public Utilities Com.	St. Catharines	Hydro				12,000	550/220	110/220	52	3,134
Toronto Power Company, Ltd	Toronto	Water	125,000	3	25	12,000	12,000/ 60,000		22	
Thorold, Corporation of	Thorold	Water	220	1	60	2,200		120		583
Waterford Hydro System	Waterford	Hydro			25	4,400	550	110	2	156
Waterloo Water & Light Com	Waterloo	Purchased	900				550	110/220	58	827
Welland Electrical Co., Ltd	Welland						220	110		325
Wellesley Lt. & Pr. Com	Wellesley						550	110	3	95
Western Counties Electric Co., Ltd.	Brantford	Water	4,000	3	60	2,200	220	110	116	2,057
London, Ont.—										
Alvinston Power Co., Ltd	Alvinston	Steam	40 to 50	DC.		120	120	110		6

Blyth, Corporation of	Blyth	Steam	45	1	133	1,100		110		88
Bairtland, H. T.	Park Hill	Steam	100			220		220		
Cargill, Limited	Cargill	Water	96			240	220	110		
Chatham Gas, Limited	Chatham	Steam & Gas	1,970	2	60	2,300	110/440	110/220	54	1,768
Clinton Public Utilities Com	Clinton	Hydro	600	3	25	13,200	550	110	7	340
Clouter, Geo. & Son	Thedford	Steam	80	1		1,100	110	110		65
Delaware Police Village	Delaware	Hydro	100		25	13,200		110		35
Essex County Lt. & Pr. Co., Limited	Leamington	Steam	750	3	60	2,200	110/220	108	55	1,742
Exeter Public Utilities Com	Exeter	Purchased	235	3	25	2,200	550	110/220	3	260
Forest Public Utilities Com	Forest	Hydro		3	25	2,300	550	110	6	358
Glencoe Electric Lt. Com	Glencoe	Gas	100	3	60	2,200		110		76
Goderich Waterwks. & Elec. Lt. Com	Goderich	Hydro			25		550	110	10	689
Greene Swift, Limited	London	Steam & Hydro	100 & 50	DC.		125/500	500	110		6
Hamlet of Elmwood	Elmwood	Hydro		3	60	2,200	220	115	2	38
Helena Costume Co., Limited	London	Steam	600	DC.		220/110	220/110	110		
Hydro-Electric System	Beachville	Hydro		3	25	13,200	550	110	3	61
" "	Blenheim	Hydro				2,300		110	2	300
" "	Bothwell	Hydro					2,200	110	2	150
" "	Chesley	Hydro	4,000	3	60	22,000	2,200	110	12	268
" "	Comber	Hydro						110		75
" "	Dorchester	Hydro				2,200	220		1	83
" "	Dresden	Hydro					220/550	110	1	300
" "	Dutton	Hydro	1,300	3	25	2,300	550	110	1	175
" "	Drumbo	Hydro		3		26,400	4,000	110/220		57
" "	Embro	Hydro				13,000	220	110	3	92
" "	Hensall	Hydro			25		550	110	3	137
" "	Tillsonburg	Hydro	450			13,000	550	110	20	679
" "	Lucan	Hydro					110/550	110	8	145
" "	Plattsville	Hydro							3	80
" "	Port Stanley	Hydro		3	25	2,200	220/110	110	1	200
" "	Sarnia	Hydro	3,000	3	25	4,000/550	110/550	110	58	2,589
" "	St. Thomas	Hydro				13,200	550	110	112	3,020
" "	Rodney	Hydro								97
" "	Thamesville	Hydro					220	110		220
" "	West Lorne	Hydro		3	25	2,200	110/220	110		96
" "	Tavistock	Hydro	350		25	13,200	550	110/220	3	150
" "	Thamesford	Hydro				4,400	220/550	110	3	93
" "	Tilbury	Hydro		3		4,000	220	110	5	214
" "	Walkerville	Hydro		3	25		220/550	110/220	75	2,108
Ingersoll Water, Lt. & Sewer Com	Ingersoll			3	25	13,000	220/2,200	110	51	875
Kincardine Waterworks & Elec. Lt. Com	Kincardine	A. T. B.	250	3	60	2,300		110		240
Lambeth, the Trustees	Lambeth	Hydro			25		550	110	1	78
London Public Utilities Com	London	Hydro		3	25		250/2,200	110	409	10,146
Listowel Public Utilities Com	Listowel	Hydro					550	115	10	360
Paisley Electric Lt. Co.	Paisley	Water	135	1	133	2,200	110	110		21
Mildmay Electric Lt. Co., Ltd	Mildmay	Purchased					550	110		52
Mt. Brydges, Village of	Mt. Brydges			1			2,200	110	1	70
Norwich Electrical Dept.	Norwich						220/2,200	110	5	294
Mitchell Public Utilities Com	Mitchell	Hydro	300	2	60	1,100	550	110	22	290

APPENDIX K.

List of Electric Light and Power Companies Registered under the Provisions of the Electricity Inspection Act—*Continued.*

District and Company.	Address.	Prime Mover.		Phases of System.	Frequency of System.	Generator Voltage.	Service Voltages.		Number of Meters.	
		Type.	Horse Power.				Power.	Lighting.	Power.	Lighting.
London, Ont.—cont.—										
McHardy, James	Merlin	Gas	50	DC.		110		110		8
Ridgetown Public Utilities Com	Ridgetown	Hydro			25		220/550	110/220	4	300
Rock Glen Power Co., Limited	Arkona	Water	60	3	60	2,200	220/2,200	110	2	68
Rose, Walter	Teeswater	Water & Steam.	45 & 55	2 & 1	133	1,100		110		97
Sandwich, Windsor & Amherstburg Ry	Windsor	Steam	750	2 & 3	60	2,300	220	110	110	2,360
Sauble Falls, Lt. & Pr. Co	Wiarton	Water	220	3	60	6,600	220	110		88
Seaforth Water, Lt. & Sewer Com	Seaforth	Hydro					110/2200	110	21	405
Southampton Elec. Lt. & Power Co.	Southampton	Water	350	3	60	6,600	220/550	110	2	500
St. Mary's Water & Lt. Commission.	St. Mary's			3	25	2,200	220/550	110/220	34	751
Stratford Public Utilities Com	Stratford	Hydro	2,500	3	60	2,200	220/550	110/220	105	2,800
Strathroy Public Utilities Com	Strathroy	Hydro	300	3	25	13,600	550	110	11	523
Stewart, Walter & Son	Lucknow	Steam	75	DC.		120		110		16
Thuell, Robt. J	Brussels	Steam		2		220		220		100
Wallaceburg Hydro-Elec. System	Wallaceburg	Hydro	500			4,400	220/550	110	10	646
Walkerton Electric Lt. & Pr. Co	Walkerton	Water	450	3	60	2,300	220	110	6	250
Wingham Electric Light Dept	Wingham	Steam & Water.	400	3	60	2,300	550	110	4	400
White-Marvin	Wheatley	Gas	35 & 18	DC.		115		125		
Woodstock Water & Light System	Woodstock	Hydro	1,200	3	60	2,200	220/550	110	33	1,720
Wroxeter, village of	Wroxeter	Steam	50			100/105	1,000	105		48
Ottawa, Ont.—										
Almonte Electric Light Com	Almonte	Water	300	3	60	2,300		115		403
Beach M.F. Estate Power Plant	Iroquois	Water	400	3	60	2,200				
Brown, H. & Sons	Carleton Place	Water	725	3	60	2,200	110/2,200	108	3	585
Calabogie Light & Power Co	Renfrew	Water	6,000	3	60	6,600	33,000	110/220		
Chatrand, Joseph	Alfred		20	DC.		110/120	115	115		
Chesterville Hydro-Electric System	Chesterville	Hydro					220	110	3	130
Corepal, J. N	Casselman	Water	500	3	60	2,300	440	110		8
Coupal, J. N	Crysler	Water & Steam.	90	2	60	2,300		110		
Cobden, Village of	Cobden	Water	135	3	60	2,300	2,200	110	1	70
Cross, F. T	Farm Point, Que	Water	160	3	60	4,400		110		
Edwards, W. H	Pakenham	Water	100	1	60	1,000		110		
Galetta Electric Pr. & Milling Co	Arnprior	Water	1,400	3	60	2,300	110/2,200	110	3	302

Gatineau Pt. Electric Lt. & Water-works Dept.	Gatineau Pt., Que.	Purchased	45		60		2,200	104	1	15
Hawkesbury Electric Lt. & Pr. Co., Ltd.	Hawkesbury	Water	6,000	3	60	17,000	110/550	110		88
Hull Electric Company	Hull, Que.	Water	980	2 & 3	60	2,200	230/550	118	27	2,208
Iroquois, Corporation of	Iroquois	Water	150	3	60	2,200	550	110		
Laurentian Water & Pr. Co.	Mt. Laurier, Que.			3	60	2,400	220/550	110		40
Maniwaki Electric Co.	Maniwaki	Water	265	3	60	2,300	220	110	3	3
MacLaren, Albert	Buckingham, Que.	Water	550	2	60	2,300	110	110		
McRae, John	Eganville	Water	225	3	60	110		110		6
Morrisburg Electric Lt. & Pr. Co.	Morrisburg	Water	250	3	60	2,300	110	110		
North River Electric Co.	St. Andrews, Que.	Water	385	3	60	2,300	220	110		4
Ottawa & Hull Pr. & Mfg. Co., Ltd.	Ottawa	Water	13,000	2 & 3	60	2,200/ 11,000				
Ottawa Power Co., Limited	Ottawa	Water	4,000	2	60	2,250	220	220	1	
Ottawa Electric Company	Ottawa	Steam & Water	17,000	2	60	2,300	214/428/ 550	107	435	17,424
Ottawa Hydro-Electric Com.	Ottawa	Water		3	60	11,000	440/550	110	210	9,930
Pembroke Electric Lt. Co., Ltd.	Pembroke	Water	3,600	3	60	2,500	2,300	110		800
Papineauville Electric Co.	Papineauville, Que.	Steam		3	60	2,300	550	110		5
Perth Hydro-Electric System	Perth	Water & Steam	600	2	133	2,200	110/550	110	8	462
Renfrew, Municipality of	Renfrew	Water	1,800	2	60	2,300	220/550	110	1	795
Shawville Light Plant	Shawville	Gas	18		60	60	60	60		80
Smiths Falls Hydro-Electric System	Smiths Falls	Water	314	3	60	2,200	110/550	110/220	20	900
Stormont Electric Lt. & Pr. Co., Ltd.	Cornwall	Steam	150	3	60	2,300	220/550	110		925
St. Lawrence Power Company	Cornwall	Water	1,400	3	60	2,200	11,000/550	110	8	165
Vankleek Hill Electric Co., Ltd.	Vankleek Hill						240	115		31
Winchester Hydro-Electric System	Winchester	Hydro					220	110	1	206
Wilson, James	Campbell's Bay, Que.	Water	90	3	60	2,400		110		34
Williamsburg Hydro-Elec. System	Williamsburg	Hydro	2,200				220	110	1	51
Sudbury, Ont.—										
Abitibi Power & Paper Company, Ltd.	Iroquois Falls	Water	1,500/ 2,000	3	60	600	550	115/118		
Canadian Copper Company	Copper Cliff	Water	20,600	3	25	2,400	125/2,200	110	49	
Chapleau Electric Lt. & Pr. Co.	Chapleau	Water	400	3		2,300		110		343
Deagle, Fred	Blind River	Water	300	3	60	2,400	110/220	110		
Elk Lake Power Company	Elk Lake	Water	350	3	60	550/580		110		18
Great Lakes Power Company, Ltd.	Sault Ste. Marie	Water	26,100	3	60	2,300	2,300	110/220	7	7
Hydro-Electric Pr. Com. of Ontario	Callander	Water	1,200		60	2,200	220	110/220	1	113
" " "	North Bay	Water	1,200		60	2,200	220/550	100/220	22	2,650
" " "	Powassan	Water	1,200		60	2,200	220/550	110/220	1	128
Little Current, Corporation of	Little Current	Steam		2	60	2,200	2,200	110		116
Mattawa Electric Lt. & Pr. Company	Mattawa	Water	250	3	60	2,200	220	110		10
Moose Mountain, Limited	Sellwood	Steam	1,300	3	60	600	600	115	5	19
Northern Canada Power Co., Ltd.	Sandy Falls	Water	5,000	3	25	12,000	12,000		12	

APPENDIX K.

List of Electric Light and Power Companies Registered under the Provisions of the Electricity Inspection Act—*Continued.*

District and Company.	Address.	Prime Mover.		Phases of System.	Frequency of System.	Generator Voltage.	Service Voltages.		Number of Meters.	
		Type.	Horse Power.				Power.	Lighting.	Power.	Lighting.
Northern Canada Power Co., Ltd	Wawaitin Falls	Water	10,000	3	25	12,000	12,000		12	60
Northern Ontario Lt. & Pr. Co., Ltd	Cache Bay	Water	23,000	3	60	2,200	110/2,200	110		60
" " "	Cobalt	Water		3	60	11,000	110/220	110	50	1,425
" " "	Cochrane	Gas	400	3	60	2,200	220	110	27	305
" " "	Englehart	Water	540	3	60	2,300	220/2,200	110	26	185
" " "	Haileybury	Water		3	60	11,000	220	110	15	800
" " "	New Liskeard	Water		3	60	11,000	220	110	15	415
" " "	South Porcupine	Water		3	25	12,000	220/2,200	110	6	175
" " "	Sturgeon Falls	Water	2,300	3	60	2,200	110/2,200	110	1	324
" " "	Timmins	Water	12,000	3	25	12,000	220/2,200	110	34	1,080
Sault Ste. Marie Water & Lt. Dept.	Sault Ste. Marie	Water		3	60	2,200	220	220/110	75	2,925
Spanish River Pulp & Paper Mills, Ltd.	Espanola	Water	4,950	3	60	2,250	2,200	110/220		4
Steelton Branch	Sault Ste. Marie	Purchased	6,000	3	60	2,200	220	110		684
Sudbury Flour Mills, Ltd	Sudbury	Water	1,333		60	20,900	2,300	110		
Sudbury, Town of	Sudbury	Purchased	670	2	60	2,300	220	110		1,650
Thessalon, Town of	Thessalon	Steam	80	1	125	1,040	110	110	1	181
Wahnapitae Power Co., Ltd	Sudbury	Water	9,451	3	60	2,300	33,000	110		
Toronto, Ont.—										
Allison Electric Light Co	Allison	Steam	300	2	133	1,100		110		132
Hydro-Electric Power Commission	Arthur	Hydro		3	60		220	110	5	95
Corporation of Aurora	Aurora	Purchased		3	25	4,400	550	110	9	385
Wenger Milling Coy	Ayton	Water	10	DC		125		125		2
Barrie Electric Light Dept	Barrie	Hydro		2	60			110	19	1,235
Corporation of Beaverton	Beaverton	Hydro		3	60	2,200	220	110	6	190
Corporation of Beeton	Beeton	Steam	5	1	60	1,000		110		62
Bolton Hydro-Electric System	Bolton	Hydro		3	25	12,000	500	110	5	107
Brampton Hydro-Elec. Commission	Brampton	Hydro	1,200	3	25	13,000	550	110		101
Corporation of Bracebridge	Bracebridge	Water	1,850	2	60	2,200	110	110		
Brechin Hydro-Elec. Commission	Brechin	Water	225	3	60	2,200	220	110	2	39
The Knight Bros. Co., Limited	Burks Falls	Water	225		125	1,100		110		17
Hydro-Electric Power Dept	Cannington	Hydro	300	3	60	4,000	220	110	9	205

Toronto Township Hydro Elec. Committee	Cooksville	Hydro	200	3	25	2,200	550	110	12	250
G. W. Collins	Chatsworth	Hydro	.....	3	60	440	440	110	1	60
G. W. Clendennin	Clarksburg	T.B	75	3	60	2,300	220	110	.....	18
Village of Coldwater	Coldwater	Hydro	300	3	60	2,200	550	110	1	113
Water & Light Commission	Collingwood	Hydro	2,000	3	60	22,000	550	110	41	1,094
Village of Creemore	Creemore	Hydro	200	3	60	4,000	220	110	3	127
Dundalk Hydro System	Dundalk	Hydro	.....	3	60	2,200	220	110	4	150
Drayton Hydro Commission	Drayton	Hydro	200	3	25	2,200	550	110	1	90
C. Elvidge	Dunham	Hydro	.....	3	60	2,200	220	110	1	220
Hydro-Electric Commission	Elora	Hydro	225	3	25	4,000	550	110	2	175
Village of Elmvale	Elmvale	Hydro	300	3	60	2,200	220	110/220	3	142
Township of Etobicoke	Etobicoke	Hydro	.....	3	25	2,200	550	110/220	7	600
Hydro Department	Fergus	Hydro	301	3	25	2,300	550	110/220	9	272
Village of Flesherton	Flesherton	Hydro	.....	3	60	4,000	220	110	1	86
Village of Grand Valley	Grand Valley	Hydro	.....	3	60	2,200	220	110	1	104
Gravenhurst Elec. Light & Water Commission	Gravenhurst	Hydro	.....	3	60	6,600	550	110	10	375
Board of Light Commissioners	Guelph	Hydro	1,500	3	60	2,200	550	110	87	2,707
Corporation of Hanover	Hanover	Hydro	.....	3	60	.....	550	110	5	450
Hydro-Electric Commission	Harriston	Hydro	300	3	25	4,400	550	110	4	200
Public Utilities Commission	Huntsville	Water	1,500	3	60	6,600	220/440	110	2	350
Hydro-Electric Corporation	Markdale	Hydro	.....	3	60	2,200	220	110	4	184
Corporation of Markham	Markham	Steam	100	2	125	1,140	.....	110	.....	145
Georgian Bay Light & Power Co.	Meaford	Steam	500	3	60	2,300	220	110	13	230
Water and Light Commission	Midland	Hydro	.....	3	60	2,200	220	110	45	1,025
Hydro-Electric Power Commission	Mimico	Hydro	603	3	25	4,000	550	110	8	600
Village of Moorefield	Moorefield	Hydro	.....	3	25	4,400	550	110	1	28
Albert W. Dike	Mount Albert	Gas	65	DC.	.....	250	250	250	.....	.....
Water & Light Commission	Mount Forest	Hydro	400	3	60	2,200	220	110	6	278
P. J. Anderson	Newmarket	T. & Y. R	150	3	25	2,200	220	110	10	700
T. H. Fountain	New Toronto	Hydro	2,000	3	25	13,000	220	110	10	300
Corporation of Neustadt	Neustadt	Hydro	.....	3	60	2,200	.....	110	.....	60
Cataract Electric Co., Limited	Orangeville	Water	400	3	60	2,200	220	110	.....	75
The Hydro-Electric Commission	Orangeville	Hydro	.....	3	60	2,200	220	110	4	205
Water, Light & Power Commission	Orillia	Water	6,300	3	60	2,200	550	110	4	253
Public Utilities Commission	Owen Sound	Steam	1,000	3	60	2,200	550	110	83	1,811
Corporation of Parry Sound	Parry Sound	Water	425	3	60	2,200	.....	110	21	858
Light & Water Commission	Penetanguishene	Hydro	600	3	60	2,200	220	110	12	300
Hydro-Electric Commission	Port Credit	Hydro	250	3	25	13,200	550	110	1	187
Corporation of Port Perry	Port Perry	Steam	75	3	60	1,100	.....	110	.....	100
Corporation of Port McNicoll	Port McNicoll	Hydro	66	3	60	2,200	220	110	1	98
Municipality of Richmond Hill	Richmond Hill	T. & Y. R	150	3	25	2,200	550	110	8	156
Municipality of Rockwood	Rockwood	Hydro	50	3	25	15,000	550	110	4	92
Hydro-Electric Commission	Shelburne	Hydro	.....	3	60	22,000	220	110	5	190
South River Electric Co	South River	Steam	100	3	60	4,000	550	110	.....	.....
Corporation Town of Stayner	Stayner	Hydro	400	3	60	4,000	220	110	4	147
Electric Light Dept	Stouffville	Gas	60	1	60	1,100	.....	110	.....	154
A. J. Lowick & Son	Sutton West	Water	50	DC.	.....	220	.....	220	.....	.....
Hydro-Electric Department	Sunderland	Hydro	.....	3	60	4,000	220	110	1	86
Township of Brock	Sunderland	Hydro	.....	3	60	2,200	220	110	2	2

APPENDIX K.

List of Electric Light and Power Companies Registered under the Provisions of the Electricity Inspection Act—*Continued.*

District and Company.	Address.	Prime Mover.		Phases of System.	Frequency of System.	Generator Voltage.	Service Voltages.		Number of Meters.	
		Type.	Horse Power.				Power.	Lighting.	Power.	Lighting.
Toronto—cont.—										
Corporation of Thornbury	Thornbury	Water	50	1	125	1,040		110		160
Corporation of Tottenham	Tottenham	Steam	60	DC.		125		125		78
Monarch Supply Co., Limited	Toronto	Steam	300	DC.		250		110	10	53
Kent Investments Limited	Toronto	Steam	Purchased	DC.				110		42
Canada Veiling Co., Limited	Toronto	Steam	Purchased	DC.		250		110	2	2
Toronto & York Radial Ry. Co.	Toronto	Hydro		3	25	12,000	550	110	15	210
Toronto Suburban Ry. Co.	Toronto	Hydro	1,000	3	25	2,200	550	110	40	1,135
Toronto Power Co.	Toronto	Hydro	93,250	3	25	12,000			22	
Toronto Electric Light Co.	Toronto	Steam & Hydro	21,000	3	25	12,000				
Toronto Electric Light Co.	Toronto	Purchased T.P. Co.	20,000	3	25	12,000				
Toronto Electric Light Co.	Toronto	Steam	15,000	DC.		480	240	110	6,300	21,018
Toronto Electric Commissioners	Toronto	Hydro	43,801	3	25		550	115	2,188	48,273
J. W. Gould	Uxbridge	Steam	65	1	125	1,040		104		115
Village of Victoria Harbour	Victoria Harbor	Hydro	50	1	60	22,000		110		103
Village of Waubaushene	Waubaushene	Hydro	66	3	60	2,200	220	115	1	77
Power and Light Commission	Weston	Hydro		3	25	13,200	550	115	10	610
Public Utility Commission	Whitby	Hydro		3	60	4,000	550	110	12	554
Hydro-Electric Commission	Woodbridge	Hydro	300	3	25	4,000	550	110	6	100
Hydro-Electric Department	Woodville	Hydro		3	60	4,000	220	110	3	77
Montreal, Que.—										
Beauharnois Elec. Company, Ltd.	Beauharnois	Purchased	1,200	3	60	2,200/6,600	220/550	110	21	557
Bennett Limited	Chambly	Purchased	1,000	2	60	2,100	550/110	110		100
Heat and Power Company	Hemmingford	Water	80	3		2,200	112	112		47
Lachine, City of	Lachine	Purchased		3	60		550	110	52	2,355
Laprairie, Corporation of	Laprairie	Purchased		3	60	2,300	550	110	4	165
Laval Electric Company	Montreal	Purchased	1,200		30	20,000	110/2,200	110	60	1,000
Canadian Light & Power Company	Montreal	Water & Steam	28,800 & 2,500	3	60	2,200		110		43
Montreal Public Service Corporation	Montreal	Water & Steam		3	60	2,200	550	110	275	12,000
Montreal Light, Heat & Power Consolidated	Montreal	Water & Steam	236,000	2 & 3	60	2,200	110/66,000	110/220	1,956	89,786

Ste-Agathe-des-Monts	Ste-Agathe-des-Monts	Water	500	3	60	2,200	220	110	3	298
St. Lambert, Town of	St. Lambert	Purchased		3	60	2,200	550/110	110	8	742
St-Jérôme, la ville de	St-Jérôme	Water	540	3	60	6,600	220	110	3	700
Vaudreuil Electric Co., Ltd	Vaudreuil	Purchased		3	60	6,600	550	110	11	355
Valleyfield Electric Lt. Co	Valleyfield	Water	135	3	60	2,300	550/220	110	37	376
Westmount Light & Power Dept	Westmount	Steam	1,350	3	60	2,300	550	110		3,000
Quebec, Que.—										
La Compagnie Electrique D'Amqui	Amqui	Water	250	3		2,200	550	110		85
Baie St. Paul Elec. Lt. & Pr. Co	Baie St. Paul	Water	350	2	60	104/2,000		104		
St. Lawrence Pulp & Lumber Co	Chandler	Steam	2,680	3	60	600	550	110	12	156
La Cie d'Eclairage et d'Energie Electrique du Saguenay	Chicoutimi		2,400			2,200	550/110	110	1	33
La Cie Hydraulique de Portneuf, Ltée	Deschambault	Oil	625	3	60	6,600	550	110		97
La Ville de Fraserville	Fraserville		300	2		2,400		110		750
Canadian Electric Light Co	Levis	Water	4,800	3	60	10,500	110/2,200	110	85	1,817
Côté, Eugène	L'Isle Verte		30			2,300		110		
Nairn Falls Power & Pulp Co., Ltd.	La Malbaie	Water	500	3		4,400	220	110		6
Rouleau Limitée	Mont Joli	Gas	66	3	60	2,200	110	110		90
La Compagnie Chs. A. Julien, Ltd	Pont Rouge		75	3		2,300	550	110		33
Quebec Ry. Lt., Heat & Power Co.	Quebec	Water	9,825	2 & 3	64	5,500/ 2,000	220/2,200	104	335	10,612
Public Service Corporation of Quebec	Quebec	Steam	3,000	3	60	2,400	110/2,400	110	180	5,500
Beauce Electric Power Company	Sherbrooke		150			15,000	110/550	110	6	262
Deblois et Veilleux	St-Anselme	Water	60	2		2,200		110		15
Piche, Hector	St-Basile		45			1,000		80		28
La Cie d'Energie Electrique de St. Côme	St-Côme	Purchased						110		1
Municipalité, Village St-Raymond	St-Raymond	Water	100	3	60	1,100	550	110		28
La Cie Roy Limitée	St-Ulric	Water	40	3		2,300	110	110		15
Le Crédit Municipal Canadien	Rimouski	Water	550	2	60	2,200	220	110		46
La Cie Electrique de Trois Pistoles	Trois Pistoles	Steam	50	2		2,200		110		27
Sherbrooke, Que.—										
Coaticook Electric Dept	Coaticook	Water	650	3	60	2,200	220/2,200	110	16	500
Hurd, A. G	Sawyerville	Water	85		125	2,080		110		45
La Compagnie d'Eclairage Electrique du village de Megantic	Lake Megantic	Gas	150	3	60	2,000		110		165
Parker, J. B	Dixville		40	DC.		110/115		110		1
Pike, W. M. & Son	Rock Island	Water	33	DC.		110	110	110		
Scotstown Elec. Lt. & Power Co	Scotstown	Water	200	3	60	2,200		110		
Sherbrooke, Corporation of	Sherbrooke	Water	7,500	3	60	2,200/ 6,600	2,200	108	36	4,950
Southern Canada Power Co., Ltd	Ayers Cliff	Purchased				2,300	550	110		70
" " "	Beebe	Purchased				2,300	550	110	7	62
" " "	Bromptonville	Purchased				2,300	550	110		16
" " "	Capelton	Purchased				2,300	550	110		19
" " "	Compton	Purchased				2,300	550	110		29

APPENDIX K.

List of Electric Light and Power Companies Registered under the Provisions of the Electricity Inspection Act—*Continued.*

District and Company.	Address.	Prime Mover.		Phases of System.	Frequency of System.	Generator Voltage.	Service Voltages.		Number of Meters.	
		Type.	Horse power.				Power.	Lighting.	Power.	Lighting.
Sherbrooke, Que.—Con.										
Southern Canada Power Co., Ltd..	Cowansville	Water		3	60	2,300	550	110		91
" " " ..	Eustis	Purchased				2,300	550	110	1	15
" " " ..	Foster	Water		3	60	2,300	550	110		31
" " " ..	Granby	Steam & water		3	60	2,300	550	110		534
" " " ..	Hatley	Purchased				2,300	550	110		19
" " " ..	Kingsbury	Water		3	60	2,300	550	110		22
" " " ..	Knowlton	Water		3	60	2,300	550	110		37
" " " ..	Lennoxville	Purchased				2,300	550	110	12	286
" " " ..	Massawippi	Purchased				2,300	550	110	1	12
" " " ..	Melbourne	Water		3	60	2,300	550	110		55
" " " ..	New Rockland	Water		3	60	2,300	550	110		4
" " " ..	North Hatley	Purchased				2,300	550	110	4	99
" " " ..	Richmond	Water		3	60	2,300	550	110		365
" " " ..	Rock Island	Purchased				2,300	550	110	6	153
" " " ..	Sherbrooke	Water	3,900	3	60	2,300	550	110	9	
" " " ..	Stanstead	Purchased				2,300	550	110	1	54
" " " ..	Sweetsburg	Water		3	60	2,300	550	110		18
" " " ..	Waterville	Purchased				2,300	550	110	1	54
" " " ..	Ways Mills	Purchased				2,300	550	110	2	15
" " " ..	Waterloo	Water		3	60	2,300	550	110	1	184
Sutton, Corporation of Village of....	Sutton	Purchased					6,600	110	1	175
Vermont & Quebec Power Corporation	Sutton	Water & steam	1,000	3	60	2,300	550	110	2	25
Westbury Elec. Lt. & Power Co....	Cookshire	Water	300	3		3,000	550	110	3	465
St. Hyacinthe, Que.—										
La Corporation de la ville de Beloeil	Beloeil	Purchased		3	60	2,200	550	110	5	230
Southern Canada Power Co., Ltd...	Beloeil	Purchased		3	60	2,300	550	110		
" " " ...	Drummondville	Water		3	60	2,300	550	110	10	444
Farnham Electric Dept	Farnham	Water & steam	1,200/500	3	60	2,300	550	110		800
Southern Canada Power Co., Ltd...	Iberville	Purchased		3	60	2,300	550	110	9	243
La Cie Electrique de Nicolet	Nicolet	Purchased					110/220	110	4	125
The St. Maurice Light & Power Co.	Pierreville						220/110	110	2	79
Southern Canada Power Co., Ltd...	Providence	Purchased		3	60	2,300	550	110		96

" " "	St. Antoine	Purchased		3	60	2,300	550	110	2	18
" " "	St. Cyrville	Purchased		3	60	2,300	550	110		32
" " "	St. Germain	Purchased		3	60	2,300	550	110		31
" " "	St. Hilaire	Purchased		3	60	2,300	550	110		9
" " "	St. Hugues	Water & steam		3	60	2,300	550	110		41
" " "	St. Hyacinthe	Purchased		3	60	2,300	550	110	18	1,096
" " "	St. Johns	Purchased		3	60	2,300	550	110	22	828
" " "	St. Joseph	Purchased		3	60	2,300	550	110		48
" " "	St. Madeline	Purchased		3	60	2,300	550	110		23
" " "	St. Mathias	Purchased				2,300	550	110		18
Belanger, N.	St. Pie	Water	75	3	60	2,200		110		20
Southern Canada Power Co., Ltd.	St. Rosalie	Purchased		3	60	2,300	550	110		47
Three Rivers, Que.—										
Joliette, Corporation of	Joliette	Water				2,000		104		700
La Cie Electrique des Laurentides, Limitée	Rawdon	Water	300	3	60	6,600	550	110		445
North Shore Power Company	Three Rivers	Water	1,200	3	60	2,200	550	110	100	2,300
St. John, N.B.—										
Bathurst Elec. & Wtr. Power Co.	Bathurst	Water	1,000			6,600	220	110	9	285
Campbellton, Town of	Campbellton	Gas	525	3	60	2,200	110/220	110	21	600
Canadian Cottons, Limited	Marysville	Steam	100		60	2,200	550	110		135
Chatham, town of	Chatham	Oil	400		60	2,200	110/2,200	110	6	365
Dalhousie, Town of	Dalhousie	Gas	125	3		2,200	220	110	3	141
Davidson, W. R., sec'y E. L. Co.	Andover & Perth	Purchased					2,200	110	4	158
Dorchester Elec. Lt. & Power Co.	Dorchester	Steam	75	1		2,040		104		113
Edmundston, Town of	Edmundston	Water	500	1	60	2,200	220	110	2	240
Fredericton Gas Light Company	Fredericton	Steam	1,200	2	60	2,200	220	110	31	961
Grand Falls, Town of	Grand Falls	Purchased		3	60	11,000	2,200	110	4	143
King Lumber Co., Ltd.	Chipman	Steam		DC.		125	110	110		17
Loggie, A. & R., Co., Ltd.	Loggieville	Steam	65	DC.		110	110	110		
Maine & New Brunswick Elec. Pr. Co., Ltd.	Aroostook Jct.	Water	3,500	3	60	11,000	550	110	1	45
Moncton Tramways Electricity & Gas Co., Ltd.	Moncton	Steam	900	2	60	1,100	110/550	110	38	1,817
New Brunswick Power Company	St. John	Steam	7,000	3	60	2,300	250	107	335	6,800
Newcastle, Town of	Newcastle	Steam	325	2	60	2,200	220	110		360
Port Elgin Electric Light Plant	Port Elgin	Steam	50	DC.		220	220	220		45
Richibucto & Rexton Elec. Lt. Commissioners	Richibucto	Water	260	3		2,200	220	110		74
Saint Leonard Electric Co., Ltd.	St. Leonard	Purchased				110	110	110	4	56
Shediac Electric Lt. & Pr. Co.	Shediac	Water	108	3	60	2,200		110	1	90
Sackville, Town of	Sackville	Steam	200	3	60	2,300	220	220	3	237
Sherwood, C. M., Ltd.	Centreville	Water	160					110		
Sussex Manufacturing Co., Ltd.	Sussex	Steam	200	3	133	2,000		110		325
St. Stephen Electric Ltd. Co.	St. Stephen	Water	600	3	60	2,200	220	110	6	330
Woodstock Electric Railway Light & Power Company	Woodstock	Water	250	3	60	2,300	110/2,300	110	4	500

APPENDIX K.

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District and Company.	Address.	Prime Mover.		Phases of System.	Frequency of System.	Generator Voltage.	Service Voltages.		Number of Meters.	
		Type.	Horse Power.				Power.	Lighting.	Power.	Lighting.
Halifax, N.S.—										
Acadia Coal Company, Ltd	Stellarton	Steam	9,400	3	50	3,150	3,150	110		10
Acadia Electric Light Co	Wolfville	Steam & Oil	125	3	60	2,300		110		221
Annapolis Royal, Town of	Annapolis Royal	Water	245	2	66	2,500		104		3
Antigonish Electric Co	Antigonish	Steam	115	DC.		115/230		115		137
Bear River & Digby Electric Lt., Heating & Power Co	Bear River	Water	65	3	60	2,200/ 2,300		110		
Bridgetown Elec. Lt. & Power Co., Ltd	Bridgetown	Water	175	1	60	2,300		110		
Bridgetown, Town of	Bridgetown	Water	316	2	60	2,200		110		
Canada Electric Co., Ltd	Amherst	Steam	3,000		60	11,000	220/2,200	110/220	41	1,107
Cape Breton Electric Co., Ltd	Sydney	Steam	2,745	2	60	2,300	2,300	110	93	2,937
Canso, Town of	Canso	Gas	95	3		2,300		110		175
Dartmouth, Town of	Dartmouth	Water	50	3		60		110		
Dartmouth Gas, Elec. Lt., Heating & Pr. Co., Ltd	Dartmouth						220/550	110	10	728
Daley, John	Digby	Steam	136			2,300		104		190
Dominion, Town of	Dominion	Purchased		1	25	22		110		188
Edison Elec. Lt. & Pr. Co. of Springhill, Ltd	Springhill	Steam	500	1 & 2	60	2,080		104		80
Glace Bay, Town of	Glace Bay	Steam	600	2	60	2,200	110	110		625
Inverness Ry. & Coal Company	Inverness	Steam	75	DC.		125		125/115		
Kentville Electric Company	Kentville	Steam	120	3	60	2,300		110		195
Lawrencetown Elec. Lt. Commissioners	Lawrencetown	Steam	40	3		2,200				
Liverpool, Town of	Liverpool	Water	750	2	60	2,400	220	104		
Lunenburg Gas Co., Ltd	Lunenburg	Water	40	3	60	3,125		104		49
Mahone Water Commissioners	Mahone Bay	Water	80	1	60	2,300	220	110		49
Middleton Electric Light	Middleton	Water	250	3	60	2,300		100/114		149
Nova Scotia Tramways & Pr. Co., Ltd	Halifax	Steam	8,308	3	60	2,200	220/550	110/220	346	5,418
Oxford Elec. Lt. & Pr. Co., Ltd	Oxford	Water	300	3	60	2,200	220	110		32
Parrsboro Electric Lt. Plant	Parrsboro	Steam	140	1 & 2	133	2,200		104		172
Pictou County Electric Co., Ltd	Stellarton	Steam	1,625	3	60	2,300	110/220	112/104	76	1,745

Sackville River Electric Co., Ltd...	Bedford	Water	50	3	60	2,300	110/220	110		80
Shelburne, Town of	Shelburne	Water	400	3		2,300	220	110		
Stewiacke Elec. Lt. & Power Co., Ltd	Stewiacke	Steam	125	3	60	2,300		110		27
Sydney Mines Electric Co., Ltd	Sydney Mines	Steam	400	2	60	2,200	220	220	9	610
Truro Electric Light Commission...	Truro	Steam & Water.	75	3		2,300		110		
Truro Electric Light Commission...	Truro	Steam	545	DC.		125	200	125	39	840
Windsor Elec. Lt. & Pr. Co., Ltd...	Windsor	Steam	455	2	66	1,100	110	110	2	397
Waterford Public Utilities Co	New Waterford	Purchased		1	25	6,600	110/220	110	1	37
Yarmouth Light & Power Co., Ltd.	Yarmouth	Water	400	3	60	2,200	220	110	35	596
Charlottetown, P.E.I.—										
Charlottetown Lt. & Pr. Co., Ltd..	Charlottetown	Gas & Steam...	952	3	60	2,200	220/110	110	49	1,433
Ives, Charles W	North Tryon	Water	18	1	133	1,100		110		20
Kensington Electric Lt. Co., Ltd...	Kensington	Water	35	3	60	2,300	110	110		78
Leard, Geo. E., & Son	Crapaud	Water	20	2	60	2,200	110	110		29
Leard, P. W	Alberton	Water	38	3	60	2,200	220	110		71
Montague Electric Co	Montague	Water	80	3	60	2,300		110		136
Sun Electric Company, Ltd	Summerside	Steam & Gas...	150 & 144	2	133	1,200		110		361
Winnipeg, Man.—										
Beauséjour, Town of	Beauséjour	Purchased				2,200	550	110/220	2	50
Boissevain, Town of	Boissevain	Steam	135	2		2,200		110		130
Canada Gas & Electric Corporation	Brandon	Water	3,500	3	60	2,300	2,300	120	80	1,967
Carman, Corporation of	Carman	Steam	175			230		220		133
Carberry, Corporation of	Carberry	Steam	95	2	60	2,300		110/220		158
Dauphin, Town of	Dauphin	Steam	400	2	60	2,200	220	110	29	622
Killarney Electric Light Co	Killarney	Steam	700	3	60	2,300		110		115
Minnedosa Power Company	Minnedosa	Water	450	3	60	2,400	110/220	110	2	204
Morden Electric Lt. Plant	Morden	Steam	150	1	133	1,100	110	110		185
Neepawa, Town of	Neepawa	Steam	300	3	60	2,300	230	115	15	315
Paterson, D. & S	Kenton	Oil	8	DC.		120		120		
Portage la Prairie, Town of	Portage la Prairie...	Steam	900	3	60	2,200	220/550	110	33	740
Russell Electric Lt. Plant	Russell	Gas	75	3	60	2,250	110	110	1	128
Rural Local Improvement	Reston	Gas	20			150		110		85
Selkirk Electrical Dept	Selkirk	Purchased			60	2,200	110/220	110	63	466
Shoal Lake, Village of	Shoal Lake	Oil	55	DC.		110/220	220	110	4	104
The Pas, Town of	The Pas	Oil	240	3	60	2,300	220	110	3	285
Wiechman, Christian	Treherne	Steam	75					110		
Winnipeg Lt. & Pr. Dept	Winnipeg	Water	47,000	3	60	6,000	550	110	1,000	35,000
Winnipeg Electric Ry. Co	Winnipeg	Water & Steam.	40,000	3	60	2,300	110/550	110	916	16,071
Regina, Sask.—										
Assiniboia, Corporation of	Assiniboia	Oil	50	3	60	2,300	115/230	115/230		98
Arcola Light & Power Co	Arcola	Oil	44	1		1,100		110/220		99
Battleford, Corporation of	Battleford	Purchased		3	60	2,300	220	115	10	214
Broadview, Corporation of	Broadview	Gas	75	3	60	2,200		110		108
Crabb, David E	Borden	Oil	12			110	110	110		3
Canora, Corporation of	Canora	Oil	96	3	60	2,200	220	110	1	135
Carlyle Electric Light Plant	Caryle	Steam	52	3	60	2,300		110		70
Davidson, Corporation of	Davidson	Gas	110 & 50	3	60	2,200	220	110		125

APPENDIX K.

LIST of Electric Light and Power Companies Registered under the Provisions of the Electricity Inspection Act—*Continued.*

District and Company.	Address.	Prime Mover.		Phases of System.	Frequency of System.	Generator Voltage.	Service Voltage.		Number of Meters.	
		Type.	Horse Power.				Power.	Lighting.	Power.	Lighting.
Regina, Sask.—Con.										
Earl Grey, Town of	Earl Grey	Gasoline	15	DC.		115	115	115		20
Eakins, H. G	Glenavon		25			115		110		3
Eastend Garage	Eastend	Oil	25	DC.		125		115		12
Estevan, Corporation of	Estevan	Steam	350	3	60	2,200	200	100	8	374
Fort Qu'Appelle, Corporation of	Fort Qu'Appelle	Oil	25	3	60	2,200	220	110	1	51
Govan, Corporation of	Govan	Oil	20			115		110		62
Grenfell, Corporation of	Grenfell	Gas	64	3	60	2,200		100		135
Herbert, Corporation of	Herbert	Gas	64	3	60	2,300	115	115	1	163
Humboldt, Corporation of	Humboldt	Steam	200/50	3	60	2,200	200/500	110	3	260
Hutchinson, Joseph	Gull Lake	Gas	64	3	60	2,300	220	115		130
Indian Head, Corporation of	Indian Head	Steam	225	3	60	2,200	208	204		240
Kamsack, Corporation of	Kamsack	Gas	200	3	60	2,200	110/2,200	110	4	200
Kindersley, Corporation of	Kindersley	Steam	135	3	60	2,200	200	110	1	141
Lake, Dr. Herbert	Leader	Oil	62½	DC.		120	110	120	1	45
Lashburn, Corporation of	Lashburn	Oil	25			110		110		42
Langham, Corporation of	Langham	Gas	50	3	60	2,200		110		84
Lloydminster, Corporation of	Lloydminster	Gas	100	DC.		220	220	220		126
Lumsden Electric Lt. & Pr. Co., Ltd	Lumsden	Oil	25	3		2,200		110		71
McCallum Hill Building, Ltd	Regina		83–36	DC.		220	220	110	1	53
Maple Creek Lt., Pr. & Milling Co., Ltd	Maple Creek	Steam	120	3	60	2,200		110		188
Milford, Corporation of town of	Milford	Oil	150	3	60	2,200	220	110	1	215
Melville, Town of	Melville	Gas	285	3	60	2,300	2,300/220	110	10	355
Moosejaw, City of	Moosejaw	Steam	4,000	3	60	2,300	220	110	164	3,863
Morse, Corporation of	Morse	Gas	68	3	60	2,300	110	110	1	87
North Battleford, Corporation of	North Battleford	Steam	1,000	3	60	2,300	220	110	30	700
International Power Co., Inc	North Portal	Purchased		DC.			220			33
Outlook, Town of	Outlook	Gas	72	3		2,200	220	110		170
Oxbow, Town of	Oxbow	Steam	25	DC.		115/175		115		66
Prince Albert Electric Lt. & Power Plant	Prince Albert	Steam	1,520	3	60	2,200	110/550	110/220	47	1,530
Qu'Appelle Electric Lt. Co	Qu'Appelle	Gas	90			220	220	220		75
Radisson Iron Works	Radisson			DC.		115	115	115	1	48
Regina, Corporation of	Regina	Steam	10,910	3	60	2,200	110/2,200	110/220	281	5,930

Rosthern, Town of	Rosthern	Oil	40	3	60	2,300		110		76
Rosetown Electric Lt. & Pr. Co., Ltd	Rosetown	Oil	75	3	60	2,300	220/110	110	1	82
Rouleau, Town of	Rouleau	Gas	175	3	60	2,300		115		147
Saltcoats, Town of	Saltcoats	Steam	50			2,200	110	110		95
Saskatoon, Town of	Saskatoon	Steam	8,750	2	60	2,300	2,200/220	110	427	5,153
Scott Corporation	Scott	Oil	100	3	60	2,200	220	110	1	65
Semans Electric Light Co	Semans	Gas	9 & 15	DC.		120		115		25
Swift Current, Town of	Swift Current	Steam & Gas	1,165	3	60	2,200	2,200/220	110	102	880
Tisdale Trading & Milling Co	Tisdale	Steam	48	3	60	550	550	115		57
Thompson, Alex. L	Pontiex	Oil	20	DC.		110	110	110		2
Townsend, Arthur	Milestone	Oil	30	DC.		115		115		
Wadena, Corporation of	Wadena	Gas	65	3	60	2,300		110		72
Watrous Electric Lt. Co	Watrous	Gas	88	3	60	2,300	110/220	110		151
Weyburn, City of	Weyburn	Steam	550	3	60	2,300	220	110	43	745
Gordon, H. R	Wilcox	Gas	9	DC.		115	115	115		
Wilkie, Town of	Wilkie	Gas	100	3		2,200	220	110	1	160
Wolseley Lt. & Pr. Plant	Wolseley	Gas & Oil	200	3	60	2,300	110	110	3	150
Yellow Grass, Town of	Yellow Grass	Oil	25			110/115		110		70
Yorkton, Town of	Yorkton	Oil	650	3	60	2,200	550	110	30	610
Calgary, Alta.—										
Bankhead Mines, Ltd	Bankhead	Steam	500		60	2,200	110/2,200	110		385
Blairmore, Town of	Blairmore	Purchased						110		215
Bowness Improvement Co	Calgary	Gas	350	3	60	2,300	220	110	4	11
Calgary Water Power Co., Ltd	Calgary	Water & Steam	2,875	3	60	2,200	210	105	30	1,750
Calgary Elec. Lt. & Pr. Dept	Calgary	Steam	14,000	3	60	2,300	220/2,200	110/220	732	14,260
Calgary Power Co., Ltd	Seebe	Water	31,600	3	60	12,000	12,000			
Canadian West Coal Co., Ltd	Taber	Steam	200	3	60	2,300	220	110	2	153
Carmangay, Town of	Carmangay	Steam	75	DC.		220		110		50
Cardston, Town of	Cardston	Steam	100	3	60	2,200		110		206
Claresholm, Town of	Claresholm	Steam	200	3	60	2,300	2,200	110		200
Coronation, Town of	Coronation	Steam	200	3	60	2,200		110		121
Crane Cassidy Electric Co., Ltd	Calgary	Steam	100	3	60	2,300		110		161
Didsbury, Town of	Didsbury	Steam	100	3	60	2,200	220	110	1	124
Franco-Canadian Collieries, Ltd	Frank	Steam	750	3	60	2,200	220/2,300	110		4
Gleichen Electric Light Plant	Gleichen	Steam	60			115/120				40
High River, Town of	High River	Steam	160	3	60	2,200	110	110		250
International Coal & Coke Co., Ltd	Coleman	Steam	1,800	3	60	2,200	2,200			
Innisfail, Town of	Innisfail	Steam	100	3	60	2,200		110		144
Knight Sugar Company, Ltd	Raymond	Steam	125	3	60	2,200	110	110	2	200
Lethbridge, City of	Lethbridge	Steam	2,240	2	60	2,200	110/2,200	110	99	2,224
Lindstrain, A	Hanna	Steam	130	3	60	2,200	220	110		26
Macleod, Town of	Macleod	Steam	600	3	60	2,300	220	110	6	414
Medicine Hat, Town of	Medicine Hat	Steam	4,000	3	60	2,300	2,300/220	110	90	1,100
Mutz, Albert	Vulcan	Steam	75	3	60	2,300		115		98
Nanton, Town of	Nanton	Gas	75	3	60	2,200	110	110		120
North West Eng. Supply Co	Drumheller	Steam		3		2,300	220	110		133
Olds Electric Co., Ltd	Olds	Gas	60	3	60	2,200	220	110/220		90
Okotoks Electric Co., Ltd	Okotoks	Gas	70	3	60	2,200	220	110/220		30
Pincher Creek, Muncipality of	Pincher Creek	Steam	65/210	3	60	2,200		110		210

APPENDIX K.

List of Electric Light and Power Companies Registered under the Provisions of the Electricity Inspection Act—*Continued.*

District and Company.	Address.	Prime Mover.		Phases of System.	Frequency of System.	Generator Voltage.	Service Voltages.		Number of Meters.	
		Type.	Horse Power.				Power.	Lighting.	Power.	Lighting.
Calgary, Alta.—Con.										
United Electric & Engineering Co.	Bassano	Gas	125	3	60	2,300	220	110/220	1	136
Western Canadian Collieries, Ltd.	Bellevue	Steam	700	3	60	2,200	.....	110	.....	20
Western Canadian Collieries, Ltd.	Blairmore	.....	75	2	.....	2,200	220	110	1	9
Weno Power & Light Co.	Weno	Purchased	.....	.....	.....	.....	220	110	2	5
Edmonton, Alta.—										
Brazeau Collieries Limited	Nordegg	Steam	500	3	60	2,300	220/2,300	110	2	19
Camrose, Town of	Camrose	Steam	225 & 75	3	60	2,300	220	110	13	330
Edmonton, City of	Edmonton	Steam	15,000	3	60	2,200	220	110/220	423	11,895
Hardisty Electric Lt. Co.	Hardisty	Gas	50	DC.	.....	440/220	.....	220	.....	40
Lacombe, Corporation of	Lacombe	Steam	155	3	60	2,300	220	110	.....	200
Ponoka, Town of	Ponoka	Steam	250	3	60	2,200	220	110	.....	140
Wainwright Light & Pr. Co., Ltd.	Wainwright	Steam	75	3	60	2,200	220	110	1	101
Western General Electric Co., Ltd.	Red Deer	Steam	450	3	60	2,300	220	110	14	365
Wetaskiwin, Corporation of	Wetaskiwin	Steam & Gas	740	2	60	2,300	220	114	18	433
Stettler, Town of	Stettler	Steam	200	3	60	2,300	220	110	6	200
Vegreville, Town of	Vegreville	Steam	200	3	60	2,200	110/220	110	6	203
Vermilion, Town of	Vermilion	Steam	75	3	60	2,200	110	110	.....	217
Vancouver, B.C.—										
Adams River Lumber Co., Ltd.	Chase	Steam	75	1	125	1,100	.....	110	.....	46
Armstrong Electric Dept.	Armstrong	Water & Oil	110/200	3	60	2,200	110/2,200	110	5	210
Ashcroft Water, Elec. & Improvement Co.	Ashcroft	Oil	90	3	60	2,300	2,300	220	110	87
Britannia Mining & Smelting Co.	Britannia Beach	Water	11,250	3	60	6,600	220	110	.....	179
B.C. Electric Railway Co.	Vancouver	Steam	18,000	3	60	2,200	220/2,200	110	1,844	40,322
Canadian Western Lumber Co., Ltd.	Fraser Mills	Steam	2,000/ 1,000	3	60	480	440	480	35	.....
Cascade Water Pr. & Lt. Company, Ltd.	Rossland	Water	1,000	3	60	2,000	20,000	110	.....	4
Clayburn Company, Limited	Clayburn	Purchased	.....	.....	.....	.....	.....	110	.....	18
Cranbrook Electric Lt. Co., Ltd.	Cranbrook	Steam	500	2	60	2,200	220	110	12	610
Crow's Nest Pass Electric Lt. & Pr. Co., Ltd.	Coal Creek	Steam	275	DC.	.....	220	.....	220	.....	.....

Crow's Nest Pass Electric Lt. & Pr. Co., Ltd.	Michel	Steam	400	DC.		220		220		
Daly Reduction Company, Ltd.	Hedley	Water	2,700	3	60	2,200/ 6,600	220/2,200	110		2
Denver Light & Pr. Co., Ltd.	New Denver	Water	55	3	60	2,300		110		5
Fernie, Corporation of City of	Fernie	Steam	250	2	66	2,300	230	115	14	600
Granby Consolidated Mining, Smelting & Pr. Co., Ltd.	Anyox	Water & Steam.	10,800	3	60	2,200	220/2,200	110	44	210
Grand Forks, Corporation of City of	Grand Forks	Purchased					2,200	110	11	390
Greenwood City Waterworks Co.	Greenwood	Water	125	3		4,400	4,400	110	1	5
Golden Lt., Pr. & Water Co., Ltd.	Golden	Steam	60 & 90	3	60	2,200	110	110		5
Kamloops, Corporation of	Kamloops	Water & Steam.	2,000	3	60	2,200	220/110	110	35	1,069
Kalso, Corporation of	Kalso	Water	200	2	60	1,200	1,200	108/110		2
Kelowna, Corporation of City of	Kelowna	Steam	620	3	60	2,300	220	110	38	499
Merritt, Corporation of	Merritt	Steam	200	3	60	2,300	220/2,300	110		295
Mission Water, Light & Power Co.	Mission	Water	75	3	60	250		110		25
New Westminster, Corporation of City of	New Westminster	Purchased		3	60	2,300		110		3,330
Nelson, Corporation of City of	Nelson	Water	2,400	3	60	12,000	440/220	110		1,121
Okanagan Saw Mills, Ltd.	Enderby	Steam	100	1	60	2,300	2,300	110		160
Okanagan Securities Co., Ltd.	Naramata	Steam	60	3		2,000		110		10
Pentieton, Corporation of District of	Pentieton	Oil	200	3	60	4,600		110		515
Phoenix Electric Lighting Co., Ltd.	Phoenix	Purchased					250	110	1	19
Powell River Company, Ltd.	Vancouver	Water	9,600	3	50	600	600	110/220		25
Prince George, Corporation of	Prince George	Oil	300	3	60	2,200	2,200	110		185
Prince Rupert, the City of	Prince Rupert	Water	1,650	3	60	2,200		110		4
Revelstoke, Corporation of City of	Revelstoke	Water	2,300	3	60	2,300	220	110	22	740
Rossland Water & Light Company	Rossland	Purchased					110	110		92
Salmon Arm, Corporation of	Salmon Arm	Oil	150	3	60	2,200	110	110	1	100
Sandon Water Wks. & Light Co.	Sandon	Water	175	DC.		125		110		
Spences Bridge Lt. & Pr. Co.	Spences Bridge	Water	200	3	60	2,300		110		
Sumas Electric Light Co.	Huntingdon					2,200	110	110		3
Summerland, Corporation of District of	Summerland	Water			60	2,200		110		158
South Kootenay Water Power Co.	Rossland	Purchased								
Vernon, Corporation of	Vernon	Oil	725	3	60	2,300	220	110	23	700
Vancouver Power Co., Ltd.	Vancouver	Water	64,200	3	60	2,200				
West Kootenay Pr. & Lt. Co., Ltd.	Rossland	Water	28,000	3	60	2,500	60,000	110	42	
Western Power Co. of Canada, Ltd.	Vancouver	Water	40,000	3	60	4,400	60,000	115	1,100	553
Victoria, B.C.—										
Alberni, Corporation of	Alberni	Purchased								61
B.C. Electric Railway Co., Ltd.	Victoria	Water	2,300	3	60	700	2,200/500	110	385	13,176
Canadian Collieries (Dunsmuir, Ltd)	Cumberland	Water	10,000	3	25	13,200	2,200/440	110	2	146
Cumberland Elec. Lighting Co., Ltd.	Cumberland						110/220	110	7	513
Courtenay, Corporation of	Courtenay	Purchased					110	110	15	115
Duncan, Corporation of	Duncan	Oil Engine	2/100	3	60	2,200	220/110	110	3	161
Ladysmith, Corporation of	Ladysmith	Steam	160	3	60	2,200		110		433

APPENDIX K.

LIST of Electric Light and Power Companies Registered under the Provisions of the Electricity Inspection Act—*Concluded.*

District and Company.	Address.	Prime Mover.		Phases of System.	Frequency of System.	Generator Voltage.	Service Voltages.		Number of Meters	
		Type.	Horse Power.				Power.	Lighting.	Power.	Lighting.
Victoria, B.C.—Con.										
Nanaimo Elec. Lt., Pr. & Heating Co., Ltd	Nanaimo	Water & Steam.	900	3	60	2,300	110/220	110	14	1,787
Pemberton Building, The	Victoria	Steam	113	DC.	.....	110	110	110	1	13
Port Alberni, Corporation of	Port Alberni	Oil	150	3	60	2,300	.....	110	.....	145
Sayward, J. A	Victoria	Purchased	.....	.....	.....	.....	500/220	110	6	14
Uplands Limited, The	Victoria	Purchased	.....	.....	.....	.....	220	110	4	17
Vancouver Portland Cement Co., Ltd	Tod Inlet	.....	.....	.....	.....	.....	.....	110	.....	15
Vancouver Island Power Co., Ltd	Victoria	Steam	6,000	3	60	2,300	.....	.....	.....	.....
Vancouver Island Power Co., Ltd	Victoria	Water	25,500	3	60	2,300	.....	.....	.....	.....
Victoria Electric Company	Victoria	Purchased	.....	.....	.....	.....	.....	110	.....	19

REPORTS, RETURNS, AND STATISTICS

OF THE

INLAND REVENUES

OF THE

DOMINION OF CANADA

FOR THE FISCAL YEAR ENDED MARCH 31

1918

PART III

ADULTERATION OF FOOD

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1918

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" 380—Headache Powders	27
" 381—White Pepper	28
" 382—Liniment of Camphor	29
" 383—Packaged Breakfast Foods	30
" 384—Middlings (Shorts)	34
" 385—Table Salt	36
" 386—Cascara Sagrada	37
" 387—Beans	51
" 388—Registered Feeding Stuffs	54
" 390—Flavouring Syrups, etc	56
" 391—Canned Fish	65
" 392—Sausages	66
" 393—Sodium Phosphate	70
" 394—Wines and Liquors	72
" 395—Canned Corn	74
" 396—Salad Oil	76

REPORT

OF THE

ASSISTANT DEPUTY MINISTER OF INLAND REVENUE.

OTTAWA, July 15, 1918.

To the Honourable ARTHUR SIFTON,
Minister of Customs and Inland Revenue,
Ottawa, Ont.

HONOURABLE SIR,—I have the honour to herewith submit a report of the work performed by the Laboratory of the Inland Revenue Department during the fiscal year ending on the 31st of March, 1918.

It is unnecessary that I should deal in extenso with the activities of the Laboratory during the past fiscal year, as the essential details will be found in the report of the Chief Analyst which is as follows:—

The work of the Laboratories Branch concerns not only the main laboratories at Ottawa, but the sub-laboratories at Halifax, Winnipeg and Vancouver. These branches have been in successful operation during the year, and the following reports from the analysts in charge furnish details of the work done in each.

HALIFAX SUB-LABORATORY.

No. samples received.	Number reported.	Description.	Date of report to Chief Analyst.
.....	35	Butter	April 10, 1917.
.....	27	Chop feed	" 10, 1917.
.....	66	Evaporated fruit	" 10, 1917.
.....	60	Black pepper	" 10, 1917.
.....	8	Peanut butter	" 10, 1917.
72	72	Fertilizers	June 11.
28	28	Liniment of camphor	July 12.
43	43	White pepper	" 12.
49	49	Table salt	" 25.
39	39	Shorts and middlings	" 18.
60	60	Breakfast foods	" 17.
15	15	Cream of tartar	" 12.
34	34	Flour	Oct 15.
28	28	Liquid extract cascara sag	" 15.
29	29	Registered stock feeds	" 16.
32	32	Sodium phosphate, plain	" 16.
38	38	" " effervescent	" 16.
27	27	Wines, and other liquors	" 18.
30	30	Fruit flavors	" 30.
52	52	Canned fish	Nov. 9.
30	30	Sausages	" 19.
45	45	Beans	" 2 & Nov. 20.
26	26	Allspice	" 23.
23	23	Salad oil	Jan, 10, 1918.
30	30	Canned corn	Jan. 23.
20	20	Cheese	" 23.

HALIFAX SUB-LABORATORY—*Con.*

No. samples received.	Number reported.	Description.	Date of report to Chief Analyst.
20	20	Molasses	March 2.
20	20	Sugar	" 2.
10	10	Liquor arsenicalis	" 9.
11	11	Honey	" 23.
20	20	Marmalades	" 30,
28	.....	Proprietary and patent medicines.	
31	.....	Medicated soaps.	
28	.....	Condensed milk.	
20	.....	Unfermented grape juice.	
37	.....	Bran.	
11	.....	Phosphates, baking powder, etc.	
986	1,027		
142	142	Malt liquors for export.	
1,128	1,169		
25	25	Beans, Asiatic, for import.	
10	10	Canned soup, for importation	Feb. 5, 1918.
54	54	Special samples, as follows—	
		23 alcohol tests, in beer, etc.	
		10 fertilizer materials.	
		12 jams, for militia dept.	
		4 evaporated milk, for militia dept.	
		1 pepper.	
		1 corned beef.	
		1 cloves.	
		1 butter.	
		1 lemon extract.	
1,217	1,258		

Total number of samples received	1,217
Number received before March 31, 1917	196
Total number samples reported	1,258
Work in hand, March 31, 1918, not reported	155
Fees collected for analysis of above special samples, and sent to department	$116 00
Soda solution sent to C.I.R., St. John, N.B.	1 winchester.
Normal sulphuric acid	1 bottle.

WINNIPEG SUB-LABORATORY.

	No. of Samples reported.		No. of Sample reported.
Peanut butter	5	Registered stock feeds	15
Milk	10	Soaps	42
Table salt	30	Beans	58
Breakfast foods	30	Flour	38
Fertilizers	41	Salad oil	23
White pepper	30	Cheese	36
Shorts or middlings	30	Strained honey	27
Linimentum camphoræ	15	Liquor arsenicalis	33
Canned fish	38	Sugar	37
Sodium phosphate effervescent	32	Molasses	36
Sodium phosphate plain	27	Marmalade	43
Wines and liquors	11	Liquid patent medicines	31
Canned corn	43	Foods that may contain calc. phos	33
Allspice	41	Bran	37
Cascara sagrada	32	Unfermented grape juice	17
Fruit syrups or flavours	20		
Sausages	41	Inspector's samples	982

OCCASIONAL SAMPLES.

	Samples.		Samples.
Vinegar	1	Evaporated apples	4
Butter	11	Soup, canned	1
Beer	26	Shorts	1
Milk	7	Feed	1
Cream	4	Maple sugar	2
Wine	4		
Beer "Heading"	1		90
Well water	1	Inspectors' samples	982
Vanilla extract	1		
Beans	25	Total	1,072

The following excise solutions were also furnished :—

Normal soda solution	30 winchesters.
Normal sulphuric acid	2 4=oz. bottles.
Phenolphthalein solution	7 8=oz. bottles.

VANCOUVER SUB-LABORATROY.

Date.	Collection.	Total.
May 16, 1917	Fertilizers	36
June 7, 1917	Salt	28
June 11, 1917,	Breakfast foods	59
June 15, 1917	White pepper	29
June 30, 1917	Shorts and middlings	30
June 30, 1917	Liniment of camphor	15
July 21, 1917	Fruit flavours	10
September 1, 1917	"	20
September 6, 1917	Canned fish	30
September 21, 1917	Registered stock feeds	18
October 19, 1927	Flour	30
October 23, 1917	Sodium phosphate	41
November 9, 1917	Beans	44
November 14, 1917	Sausage	20
November 27, 1917	"	2
December 6, 1917	Canned corn	29
December 18, 1917	Cascara	26
December 18, 1917	Allspice	27
January 25, 1918	Wines and liquors	22
January 28, 1918	Soaps	34
February 26, 1918	Patent medicines	32
March 6, 1918	Sugar	15
March 9, 1918	Cheese	20
March 20, 1918	Molasses	12
		629

SPECIAL SAMPLES.

Apples, evaporated	23	Lemon extract	2
Beans containing hydrocyanic acid, Lima	2	Mustard	1
Burma	196	Oil, fuel	1
Beans free from hydrocyanic acid	514	Soup, import	4
Beer for export	16	Wine	3
Butter for Department of Agriculture	11		
Cider	2		776
Corn	1	Regular samples	629
Dynamite	1		
Egg-yolk powder	1		1,405

The Halifax laboratories are located in rented quarters at 50 Bedford Row.

The Winnipeg laboratories occupy a portion of the first flat in Postal Station B, corner of Magnus and Main Streets.

The laboratories at Vancouver are situated in the Customs Examining Warehouse, 326 Howe Street.

The technical staff of these laboratories including the staff at Ottawa, at present comprises 24 analysts.

The following brief synopsis shows the work which has been done during the year:—

ANNUAL REPORT—FISCAL YEAR 1917-18.

Number of Bulletin.	Nature.	Number of samples.	Number of Bulletin.	Nature.	Number of samples.
369	Vanilla extract	125	383	Packaged breakfast food	275
370	Glycerin	230	384	Middlings	203
371	Nature's plant food	.....	385	Table salt	198
372	Borax	55	386	Cascara sagrada	162
373	Butter	228	387	Beans	318
374	Chop feed	161	388	Reg. stock feeds	146
375	Evaporated fruit	289	389	Flour	237
376	Peanut butter	33	390	Flavouring syrups	141
377	Human food	.. ....	391	Canned fish	275
378	Fertilizers	349	392	Sausages	164
379	Ground black pepper	345	393	Sodium phosphate	313
380	Headache powders	102	394	Wines and liquors	114
381	White pepper	208	395	Canned corn	207
382	Lin. of camphor	94	396	Salad oil	149
				Total	5121

The following occasional work has been done.

Acetic acid	83	Dubbing	1	Peas	1
Acetyl sal. Tablets	2	Ether	3	Pepper	3
Acid	1	Evaporated milk	7	Petroleum	1
Alcolene	2	Fertilizer	19	Pomax	1
Allspice	1	Flax chaff	1	Porter	2
Anocain tablets	1	Flour	1	Salad oil	2
Apples	1	Fusel oil	9	Salicylic acid	1
Barium sulphate	2	Gasolene	2	Sargol	1
Beans	110	Hop malt	1	Sediment	1
Beer	58	Ink	1	Shorts	1
Benzol	12	Izal	3	Silver nucleinate	1
Bran	1	Jam	33	Soap	14
Bread	2	Lemon extract	1	Sod. salicylate	1
Butter	24	Liquors	5	Spirits	123
Candy	1	Lithium	1	Sterilized milk	2
Canned salmon	2	Lobsters	1	Strychnine	1
Canned soup	15	Malt coomings	6	Sugar	3
Canvas	6	Malt flour	3	Tincture iodine	1
Caramels	1	Maple sugar	7	Toluol	1
Cattle feed	3	Maple syrup	8	Turpentine	2
Cheese	30	Mercury	1	Vanilla extract,	2
Chloroform	2	Middlings	2	Vinegar	4
Cigarettes	2	Mil-Co egg	1	Water	12
Cloth	7	Milk	34	Wine	4
Cocaine	1	Nerveline	2	Witch hazel extract	1
Condensed milk	1	Nerve tonic	1		
Condition powder	1	Nutmegs	4	Total	741
Cotton seed flour	1	Nux vomica, fluid extract	1		
Cyanide potassium	1	Oleoresin vanilla	1	Vinegar tested for excise	221
Crystals	1	Oil	16	Normal soda	110
Denatured alcohol	2	Oil cedar	1	" acid	4
Disinfectant	6	Paint	36	Phenolphthalein	16
Dried corn	1	Peanut butter	1		

A large amount of work, advisory and analytical, has been performed for various departments of government service, in addition to the above. Much attention has been given to revision of food standards and the acquiring of such information as should justify recommendation of constants for articles not yet standardized.

Flavouring Extracts.—Revised standards were established by Order in Council, March 31, 1917 (published as G. 1276, April 7, 1917).

Tea.—Revised standards by Order in Council of April 18, 1917 (G. 1277, April 21, 1917).

Grain Products.—Re-written and established by Order in Council of December 3, 1917 (published as G. 1292, December 10, 1917).

Pepper.—Standards authorized by Order in Council of February 20, 1918 (published as G. 1297, February 26, 1918).

Baking Powder.—Standards by Order in Council of March 8, 1918 (published as G. 1298, March 13, 1918).

As was done in my report of last year, I forward you the introductory matter only of the bulletins issued during the year. Any one interested in details of analysis, not therein given, may obtain copies of the bulletins by applying to yourself, or to me.

It is fitting to note that the late Dr. G. P. Girdwood, of Montreal, tendered his resignation as a member of the Board of Examiners in March, 1917, consequent upon illness which made it no longer possible for him to perform the duties of office. His death occurred Oct. 2, 1917. Dr. Girdwood had much to do with the framing of the Adulteration Act, and was a member of the Board of Examiners since its formation in 1886. He always took a sincere and active interest in the working of the Act, as indeed he did in many directions, for the benefit of the public in matters of health. He is succeeded on the Board of Examiners by Prof. R. F. Ruttan, of McGill University.

I have the honour to be, Sir,
Your obedient servant,

GEO. W. TAYLOR,
Assist. Deputy Minister.

BULLETIN No. 369—VANILLA EXTRACT.

OTTAWA, 16th May, 1917.

SIR,—I beg to hand you herewith a report upon one hundred and twenty-five (125) samples purchased by our inspectors as Vanilla Flavouring Extract in April, May, June and July of last year.

By an Order in Council of 17th October, 1912, the Flavouring Extract of Vanilla is required to be prepared from the Vanilla bean, and to contain in 100 cubic centimetres, the soluble matters from not less than 5 grammes of the bean. The usual solvents are ethyl alcohol, water and glycerin.

An artificial extract may be sold, if properly labelled so as to declare its character.

A more recent Order in Council, dated 31st March, 1917, amends that above referred to by requiring that, in the latter class of Flavouring Extracts, which by the way, are not really extracts, but solutions, the word Artificial or Imitation, or other equivalent word, shall appear on the label in type as large and conspicuous as that used in any other word on the label.

It is further required that the genuine extract of Vanilla shall contain no colouring matter other than that supplied by the Vanilla bean itself.

These amendments have been found necessary because investigation has established the fact that purchasers of these articles are not actually made aware of their artificial character when the label is printed in such a way as to give prominence to non-committal words, while the important descriptive word is printed in small letters. Further, the depth of colour of an honestly made Extract of Vanilla is a fairly good index to its strength, in other words, to the amount of actual bean material used in its preparation. It may be that consumers sometimes place too much reliance upon this feature, since the most fragrant kinds of bean do not always yield the darkest extracts; but in a general way, the depth of colour is approximately proportional to the weight of bean used. Of course it is permissible to add colour to artificial extracts, since the prominent word Artificial, Imitation, or Compound, sufficiently warns the purchaser regarding the nature of the article.

While the Adulteration Act is primarily written to protect the consumer, the fact must not be overlooked that it at the same time protects the honest manufacturer of a high class article, by requiring that inferior goods must be labelled in such a way as to properly inform the purchaser.

It may be well here to draw attention to a fact already pointed out in Bulletin No. 245; namely, that alcohol is necessary in preparing an Extract of Vanilla, not so much to dissolve the vanillin, which is rendered more soluble by the presence of sugar, as in order to get the characteristic resins into solution. For this reason an extract cannot meet the requirements of a true vanilla bean extract unless it contains from 30 to 40 per cent of alcohol. Samples containing notably more than 0·2 per cent of vanillin are presumably made with synthetic vanillin, or, are at least, fortified by addition of such vanillin.

As a check upon the test for resins; or as a substitute for actual separation of the resin, some work has been done in these laboratories upon estimation of the lead number; the colour value of the extract, and determination of residual colour after precipitation with lead, according to a method described in Bulletin No. 152 of the U.S.A. Department of Agriculture. Results obtained show that substantial help in judging the quality of Vanilla Extract may be got from these determinations.

They desiderate, however, the employment of larger volumes of the sample than we usually are furnished with.

It need scarcely be said that, in the case of this collection, I have been guided by the requirements of the Order in Council of 17th October, 1912, which governed at the time of purchase.

Briefly, the results of analysis show as follows:

Samples found genuine	53
" sold as artificial, etc	54
" lost by breakage	3
" adjudged as doubtful	3
" adjudged as adulterated	12
Total	125

Adulteration consists in the Fact that the article, while artificial, is sold as genuine Vanilla Extract, or simply as Vanilla Extract, which amounts to the same thing.

It has not been considered necessary to carry out analysis, in all cases of samples sold as artificial, as compounds, or otherwise designated to show that these are not offered as genuine.

BULLETIN No. 370—GLYCERIN.

OTTAWA, April 30, 1917.

SIR,—I beg to say that, in consequence of complaints received by this Department, in November of last year, to the effect that adulteration of glycerin was suspected in certain localities, our inspectors were instructed to make a collection of this article, as offered at retail in drug shops and elsewhere.

During December of last year, and the first three months of the current year, two hundred and thirty samples were sent in for examination, with results which are detailed in the present report. These may be summarized as follows:—

Samples judged as genuine	194
" " as doubtful	6
" " as adulterated	30
Total	230

In order to render clear the grounds upon which the above judgments are made, the following explanations are necessary.

The tri-hydricalcohol glycerol is an essential component of all fats and oils; and is obtained from these by processes of saponification or hydrolysis. Glycerin may be regarded as the ordinary name for Glycerol, as this is found in commerce. Chemically pure Glycerol is not found in ordinary commerce. Its great hygroscopicity causes it to take up more or less water from the atmosphere, so that about three (3) per cent of water is present in the best commercial samples. The British Pharmacopoeia recognizes as Glycerin an article of specific gravity 1·260, which corresponds to about 3 to 4 per cent of water.

I have judged as genuine all samples which contain less than five (5) per cent of water.

Samples containing between 90 and 95 per cent of glycerol I have judged as *doubtful*. It is scarcely probable that the most careless handling of glycerin, could, account for the introduction of anything like ten (10) per cent of water into the article; so that when more than ten per cent water is present, I am compelled to infer that this has been added with intent. Such samples are judged as adulterated by addition of water; and this report shows that 20 samples come under this head.

Ten (10) other samples contain sugar syrup, which must, of course, be regarded as adulteration.

I would respectfully recommend that action be taken in the cases of 30 samples which are found to be adulterated, in accordance with explanations given above.

BULLETIN No. 371—NATURE'S PLANT FOOD.

OTTAWA, 13th April, 1917.

SIR,—I would respectfully call your attention to a gross fraud sought to be perpetrated upon the farmers of Canada by the sale of an article offered as Nature's Plant Food; the manufacturers having their Canadian Agency at Chatham, Ont.

The article in question is merely a crushed rock of the Syenite type, such as exists in limitless quantity at very many places in Canada, where it is used for macadamizing roads, and other purposes. I cannot call it a pulverized rock, since a sample examined from this point of view, in these laboratories, gives the following results:—

Fineness.	Passes 100 mesh sieve	50·9 p.c.
	" 80 "	9·0 "
	" 60 "	5·0 "
	" 40 "	6·1 "
	" 20 "	12·2 "
	Held by 20 mesh sieve	16·8 "
		100·00

Basic phosphate and other slags, having vogue as fertilizers, are required to be ground so that at least 80 per cent passes the 100 mesh sieve, and the whole, as a rule, passes the 80 mesh sieve.

The same material was sold at various places in the United States as "New Mineral Fertilizer"; and the Director of the Maine Agricultural Experiment Station, at Orono, made a test of it in 1911. The results in detail are published in Bulletin No. 209 of the above mentioned station, and copies may be had by addressing Dr. Chas. D. Woods, Director. The following quotation shows results obtained on plots which were planted to potatoes and corn, and in each case treated as indicated.

1. No fertilizer was added.
2. A complete fertilizer was added.
3. The so-called New Mineral Fertilizer was added.

	Total Crop, Potatoes.	Pounds, Corn.
1. Without any fertilizer	285	175
2. With good fertilizer	346	450
3. With New Mineral Fertilizer	265	145

Our Fertilizers Act is intended to protect the farming industry by requiring that no fertilizer shall be sold unless it is registered, and carries a statement of its actual content in fertilizing material. Most, if not all, the States of the American Union, take the same precautions. It is in consequence of this that the promoters of this fraudulent enterprise have found it necessary to change the original name, and to describe their product otherwise than as a fertilizer.

Nevertheless, the material is actually sold as a fertilizer, and described to the farmer as such. Thus, a pamphlet published by Nature's Plant Food Co. contains the following statements: at page 9, "Why plant two acres of half fertilized corn, when by using our Plant Food you can raise more and better corn on one acre of ground? "Nature Plant Food can be applied to all growing crops by surface application, clear up to the time of harvesting and every application will show immediate results by forcing the plants to a more vigorous growth and greater yield." Page 15. "Nature's Plant Food, insures crops of palatable, finely flavoured vegetables, and juicy, aromatic, wholesome fruit." "If the land is in ordinary good condition and a general crop is to be raised, we advise using this Plant Food at the rate of 1,000 or more pounds to the acre." Page 15. "Strawberries; when setting out new vines, work about one ton per acre of this Plant Food into the top soil." Page 19. "This Marvellous Food contains the very minerals the soil craves, and the plants must have." Page 42. "As the source of the potash and the soda for the sugar beets, we can only consider Nature's Plant Food, which, thanks to God, is contained to a very slight degree in many soils, while the nitrogen is furnished by the atmosphere."

I hold that the above quoted statements, with numerous others, do convey to the reader, the idea that the article is a fertilizer, and that they are written with this intention. The whole trend of its advertising is to make the farmer believe that it is to all intents and purposes, an agricultural fertilizer; and anyone who purchases the material will, to that extent, be certain to curtail his purchase of really valuable fertilizers.

It is, in reality nothing more than crudely pulverized rock, such as may be obtained from the siftings of any stone pile, where Syenite has been crushed for road making, and is not even ground to any uniform degree of fineness.

As a fact, nature's true plant food consists of the gases of the atmosphere, rain water, and the soluble constituents of fertile soil. Many soils are deficient in the more soluble ingredients, namely compounds of nitrogen, phosphorous and potassium, and less frequently of calcium. For this reason manufactured fertilizers seek to supply the missing substances. Compounds of nitrogen are normally the most costly of these, but for the last year or two, potassium compounds are held at excessively high price. The article now under consideration contains no nitrogen, and traces only of phosphorous and potassium; these traces being locked up in compounds which make them practically useless to agriculture. The other ingredients of this article are normally present in sufficient quantity in all ordinary soils, and their purchase at any price, is unwarranted; while at $30.00 per ton, the matter becomes sheer waste of money.

It would be bad enough at any time to spend money for worthless material, under the delusion that one was buying an agricultural fertilizer; but it becomes a positive crime just now, when because of war conditions we are asked to make our farms as productive as possible. The purchaser of this material is not only buying that which has no agricultural value; but he is thereby prevented from purchasing effective fertilizers; and losing the season.

Mr. Inspector Forde of this Department has just returned from Rumford, Maine, where the company is stated to have its mills. He reports that a nickel mine, some ten and a half miles from Rumford, closed down six or seven years ago, and was reorganized later by a Mr. McCrellis, with a view to selling the crushed rock as New

Mineral Fertilizer. A number of farmers, and others, in the locality were interviewed, and without exception denounced it as a fake. A few of the statements made may be quoted:—

Mr. James S. Morse, member of the State Legislature, says: "They have prohibited the sale of it in the State of Maine, as it is absolutely no use."

Mr. Jerry Martin: "Have tried the stuff: it is no good; don't ask me to recommend it; my crops were much better where none was used."

Mr. F. A. Coffin: "Yes, I have used this fertilizer, and consider it useless. I might just as well grind up the rock on my own farm, and use the money."

Mr. T. J. Goddard: "Have used the stuff; it is no use; spoiled my crop; it is only a fake."

Mr. Allen, of Allen, Sterling and Lothrop: "We sell several kinds of fertilizers, but never handle this particular one, as we know it to be a fake."

It seems scarcely necessary to quote further; because the fraudulent character of the article is sufficiently indicated in the way it is advertised.

Most of the statements made in the pamphlets are garbled extracts from various publications, and many of them are patent falsehoods. Thus, on page 25 of the larger pamphlet is the following: "I have recently had one of the best chemists in Boston make careful tests as to the solubility of the material, with nothing but pure rain-water. He found, in five days' time, after filtering through a filter paper, that 5·9 per cent had become soluble, without changing the water in the test tube. In fourteen days, 17 per cent went into solution with pure rain-water. In twenty days, 27 per cent went into solution." It goes without saying, that rocks of this kind are insoluble in rain-water; and it is because of their insolubility in rain-water that they persist. In order, however, to meet the above ridiculous statements by direct evidence, I caused the actual test to be made, and found the water soluble matter, in five days, to amount to 0·095 per cent or less than one-tenth of one per cent.

In a land of free speech like ours, where every fad, social, religious, political, or other, has its apostles, it need not be regarded as wonderful that even the legitimate use of fertilizers should find voluble opponents. I am aware that advocates of so-called "clean culture" are in evidence (see Sampson Morgan in The Vegetarian for March 1917, reprinted in Chemical News of March 16th, 1917.) But the advocacy of this absurdity is one thing, and the attempt to sell by fraudulent means a broken rock at fifty times its value is quite another thing.

As the spring season is upon us, and the demand for fertilizers is very great, I would respectfully press upon you the necessity of immediate action, in the interests of our farmers, who are having this useless article pressed upon their attention by self-interested agents. I would suggest the immediate publication of this letter, in an edition of 10,000 copies; and ensure its effective distribution by our inspectors, and through the manufacturers of registered fertilizers. Agricultural papers will doubtless give it additional publicity.

BULLETIN No. 372—BORAX.

OTTAWA, May 18, 1917.

SIR,—I beg to hand you a report upon fifty-five (55) samples of Borax purchased by our inspectors in October and November of last year.

This article is chiefly employed for laundry purposes, and most of the samples herein reported were packaged and labelled as intended especially for such use.

Borax is, however, very largely employed as a food preservative, particularly in meats, meat products, butter and cream. It is also used as a mouth wash, as an eye-lotion, and for general antiseptic purposes. For such use, it should be free from more than traces of arsenic, and should, of course, be true to name.

An Order in Council of October 24, 1912 (published as G. 1048) limits the amount of arsenic permissible in borax for use in foods, to 4 parts per million. Such a degree of purity is perhaps not to be expected in borax as employed for laundry purposes.

The addition of carbonate of soda to borax is only explicable on the assumption that the manufacturer desires to cheapen his product, or to mislead the purchaser with a view to enhanced profit to himself. Unless declaration of the presence of carbonate of soda is made at the time of sale, either by verbal statement or by statement on the label, such admixture must be regarded as adulteration under the Act. (Section 3, (b).)

Borax is quoted on the New York market on May 5, 1917, at $8 per 100 pounds; *Bicarbonate of Soda,* at $1.95 per 100 pounds and *Sal Soda,* at $1.05 per 100 pounds. (Metallurgica & Chemical Engineering, Vol. XVI, No. 10, p. 619.)

It may be assumed that manufacturers intending to introduce borax into foods as a preservative, would not purchase the article without a guarantee of its freedom from arsenic; in other words, that borax as sold for laundry purposes should not be expected to meet the rigid standard set for borax as a food preservative.

A considerable number of the samples herein reported, are found to contain much more arsenic than 4 parts per million; some indeed showing from 50 to 100 parts per million. While an article of this quality may be decidedly objectionable or even dangerous, if employed in cream or butter, I have merely drawn attention to those cases in which excess of arsenic has been found, without charging adulteration under the Act. It may be sufficient to emphasize the fact that borax for food preservation, should be purchased with a trustworthy guaranty of purity, and that ordinary commercial borax is quite unfit for such a purpose.

The following synopsis of results, presents the matter of this report at a glance:—

	Samples.
Found genuine, and without excess arsenic	21
Found genuine but with excess arsenic	19
Found to contain carb. soda, declared	2
Found to contain carb. soda without declaration and therefore adulterated	13
Total	55

BULLETIN No. 373—BUTTER.

OTTAWA, May 18, 1917.

SIR,—I beg to hand you a report upon 228 samples of Butter, procured by our inspectors during January, February and March of the present year.

This collection was made in consequence of many complaints, suggesting the extensive sale of oleomargarin as butter, or as a butter substitute. It is gratifying to know that not a single sample of the article was obtained by our inspectors; although this may not be held as conclusive proof that oleomargarin is entirely absent from our markets. Another complaint to the effect that excessive amounts of water were frequently incorporated into butter, appears to be substantiated by the fact that seven

(7) samples contain decidedly more water than the 16 per cent fixed as a maximum permissible limit; while sixteen (16) other samples nearly reach, or slightly exceed this limit.

Legal butter should contain approximately 82·5 per cent of milk fat. Slightly less than this amount may be present in samples of butter which contain maximum, or nearly maximum amounts of water, salt and curd; but as a rule, the defection does not exceed one or two per cent.

Thus, nearly 90 per cent of the samples (138 in number) reported in Bulletin 334, and collected in October, November and December of 1915, contained at least 82·5 per cent fat, many of them considerably exceeding this limit. Of the present collection, representing 228 samples, 187 samples contain at least 82·5 per cent of fat. (82 per cent of the total collection.)

Since milk fat is the most valuable constituent of butter, it is important that any deficiency, below 82·5 per cent should be small. Six samples show deficiencies varying from 5 to 13 per cent of fat.

No admixtures or substitutions of foreign fats, instead of milk fat occur.

BULLETIN No. 374—CHOP FEED.

OTTAWA, May 21, 1917.

SIR,—I beg to hand you a report upon a Stock Feed, purchased as "Chop Feed" by our inspectors in January, February and March of the present year. One hundred and sixty one (161) samples have been examined, with results which may be sumarized as follows:—

	Samples.
Found genuine	123
Found genuine as to feeding value, but containing an excess of noxious weed seeds	29
Found nearly of minimum value and passed (one sample with excess weed seeds)	5
Found adulterated under the Act	4
Total	161

So far as the nutrient value of this class of Feeds is concerned, our standards require Chop Feed to possess:—

Protein	At least 10 per cent.
Fat	At least 2 per cent.
Fibre	At most 10 per cent.

Chop Feed is defined as whole grain of one or more kinds, more or less finely ground. The known variations in value possessed by different grains are so great that, of necessity, this class of feed must vary greatly in its protein and fat. Examination of this report will demonstrate that the commercial article, while approximating to 10 per cent of protein, greatly exceeds this limit in many instances, and particularly is this the case where peas (or beans) are employed in its manufacture. There is a temptation, in such cases, to reduce the protein percentage to standard minimum requirements by adding fibrous material, such as oat-hulls. This, of course, constitutes adulteration under the Act.

It seems to me that a much better way of assuring recognition of value, above minimum value as fixed by law, would be for the manufacturer to register his product, and to sell it under a guarantee of value, such as is required in the case of mixed feeds. This is done by comparatively few manufacturers of Chop Feed.

The difficulties in the way of taking this course, are evident in the case of the smaller mills, whose chief business is of a local character, and who do not carry a large enough stock to justify the expense of analysis and packaging. There should be no special difficulty in the case of the larger manufacturers.

In Bulletin No. 191 (Nov. 1909) which deals with the subject of Stock Feeds, I have discussed the advantage to both manufacturer and consumer which would result from more specific description of this article (Chop Feed); and the arguments there adduced are strengthened by the present report. Until definite action is taken however, we must recognize Chop Feed as an article which is required to possess a protein value of 10 per cent, a fat value of 2 per cent, and a crude fibre content not exceeding 10 per cent by weight.

Strict interpretation of the meaning to be given to regulations limiting vital weed seeds in Feeding Stuffs, has not yet been formulated.

BULLETIN No. 375—EVAPORATED FRUIT.

OTTAWA, June 11, 1917.

SIR,—I beg to hand you a report upon the examination of 289 samples of evaporated or dried fruits.

The samples in question were variously collected by our inspectors in January, February and March of this year, and were put in hand for analysis within a few weeks of their being furnished to the laboratories, meantime being kept in cold storage, in order to prevent any important change in character.

This inspection was intended to have special regard to the content of sulphurous acid, which is understood to be extensively used for bleaching purposes, in such fruits as are desired to be light in colour, as well as for preservative purposes, the antiseptic properties of free sulphurous acid being well known.

In July, 1907, the Department of Agriculture at Washington established conditional regulations respecting the amount of sulphurous acid permissible in foods and food products containing acetaldehyde, sugars, etc., with which sulphurous acid may combine; and decided to institute no prosecution if the total amount of sulphur dioxide in the finished product did not exceed 350 parts per million, of which not more than 70 parts were free sulphur dioxide.

Later (March, 1908) Food Inspection Decision No. 89 decreed as follows: "No objection will be made to foods which contain the ordinary quantities of sulphur dioxide, if the fact that such foods have been so prepared is plainly stated upon the label of each package.

An abnormal quantity of sulphur dioxide placed in food for the purpose of marketing an excessive moisture content, will be regarded as fraudulent adulteration under the Food and Drugs Act of June 30, 1906, and will be proceeded against accordingly."

In the absence of definite statement regarding "ordinary" and "abnormal" quantities of sulphur dioxide, it would naturally be difficult to make the above regulations effective and useful; and I am not aware that any prosecutions have been undertaken by the United States Federal authorities in the matter.

Individual States have, however, taken definite ground; and the following letter to the trade, by Commissioner E. F. Ladd of North Dakota (Am. Food Journ., February, 1914) shows the attitude of that State in the matter:—

DEAR SIR,—I beg to call your attention to the fact that at the present time considerable quantities of dried fruit, which are not permissible under the provisions of our law, are being shipped into the State of North Dakota.

Sulphur dioxide is prohibited in food products in North Dakota, and yet I have not strictly enforced this feature of the law where dried fruit contained only a slight amount of sulphur dioxide. The tentative standard of 350 mgs. per kilogram of fruit as announced by the Bureau of Chemistry under the National Law, is certainly being exceeded at the present time in that some of the samples recently analyzed have been found to contain from 600 to 750 mgs., or more than double the standard referred to. Such dried fruit must be removed from the State.

The Department does not recognize as legal, in the State, raisins, silver prunes or figs bleached with sulphur dioxide as we have not been convinced that there is any necessity, in a good article, for the use of sulphur dioxide in either one of these products.

You are hereby notified that a strict compliance with these provisions is requested on the part of all who are handling dried fruit in this State.

E. F. LADD,
Food Commissioner.

Your advisory Board has made a careful study of the question of sulphurous acid in foods; and consequent upon its recommendations, an Order in Council dated 4th April, 1914 (published as Circular G. IIII) limits the amount of sulphurous acid which may be present to 1 part in 10,000 parts in beverages, and 1 part in 2,000 parts in solid foods; the presence of sulphurous acid must be declared on the label, or otherwise.

The above permitted amounts corresponds respectively to 100 and 500 parts per million; and if they be interpreted as referring to sulphurous acid in the free state, they are much more liberal than the tentative limits established under Food Inspection Decision 75 U.S.A.

They are, nevertheless, greatly exceeded by many samples herein reported, and I have drawn attention to the fact that sulphurous acid is in excess, whenever the amount found reached 2 parts per 2,000, that is, twice the amount fixed as a limit under Order in Council of April 4, 1914. This occurs in 29 samples of dried peaches and 16 samples of dried apricots.

In greater detail, the results of this inspection may be thus exhibited:—

—	Currants.	Peaches.	Apricots.	Apples.	Pears.	Figs.	Prunes.
Found genuine	.....	31	32	70	9	40	13
Found to contain sulphurous acid in excess, but otherwise of good quality	.....	20	9	.....	.....	.....	.....
Found to contain sulphurous acid in excess, but otherwise of fair quality	.....	8	6	.....	.....	.....	.....
Found to contain sulphurous acid in excess, and otherwise of doubtful quality	.....	1	1	.....	.....	.....	.....
Of doubtful quality without excess sulphurous acid	.....	7	10	12	4	4	.....
Unfit for food, by reason of dirt or decomposition	1	2	5	5	3	1	1
Adulterated by excess water	.....	.....	.....	4	.....	.....	.....
Total samples	1	69	53	91	16	45	14

While it would be proper to describe as *adulterated* all samples containing more than 1 part of sulphurous acid per 2,000 parts by weight of material, I would respectfully suggest the publication of this report as being the first systematic inspection, in this regard, under the Order in Council of April 4, 1914, with a warning to the effect that declaration of bleaching by sulphurous acid will hereafter be exacted. Most of the fruits thus coming under criticism are apparently of foreign origin; and it is noteworthy that no free sulphurous acid is found in any of the samples of evaporated apples, essentially of Canadian origin examined.

An Order in Council of March 16, 1916 (published as G. 1238) fixes the limit for water in Evaporated Apples at 25 per cent. Under earlier order (October 17, 1912, published as G. 1044) fixed the limit at 27 per cent which further investigation proved to be inconsistent with good keeping quality.

Four samples of evaporated apples are found to contain excess water; and three of these are distinctly fermented, as was to be expected. All must be condemned as adulterated under the Act. Eighteen samples of fruit are found to be unfit for food, and adultered under section 3e, of the Act; which describes as adulterated any food consisting wholly or in part of a diseased or decomposed or putrid or rotten animal or vegetable substance. Dirt is not specially mentioned as constituting adulteration; but mouldiness, the presence of worms, and excrementitious matter, must be held to justify condemnation under the subsection referred to.

The samples now indicated comprise:—

Peaches	2	samples
Apricots	5	"
Apples	5	"
Pears	3	"
Figs	1	"
Prunes	1	"
Currants	1	"

It is of course quite possible that the packer is not responsible for the character of this fruit as sold.

BULLETIN No. 376—PEANUT BUTTER.

OTTAWA, June 8, 1917.

SIR,—I beg to hand you a report upon 33 samples purchased by our inspectors as Peanut Butter.

This article appears to be essentially the roasted and ground kernel of the peanut (Arachis hypogœa). Its average composition, as found by analysis of the samples herein reported, is as follows:—

Average composition.

Acidity	25	Samples	2.34 N per 100 grammes.	
Water	33	"	1.41	per cent
Protein	33	"	27.45	" "
Fat	33	"	47.55	" "
Sugars	20	"	5.58	" "
Starch	20	"	7.56	" "
Fibre	20	"	1.22	" "
Salt	33	"	1.18	" "
Ash (Including salt)	33	"	3.03	" "
Refractive index of fat, at 25° C				1.4695
Iodine number of fat				93.2

U. S. Standards (Leach, Foods Xc. 2nd Edn. p. 522).
Refr. Index at 25° C 1.4690 to 1.4707.
Iodine number 87 to 100.

The mean composition of a number of samples analyzed at the Connecticut Agricultural Experiment Station, and purchased as Peanut Butter, or Peanolia, is as below; (Wiley, Foods, etc., 2nd Edition, p. 421).

	Peanut Butter.	Peanolia.
Water	2.10	1.98
Protein	28.66	29.94
Fat	46 41	46.68
Sugar and Dextrin	6.13	5.63
Starch	6.15	5.58
Insoluble cellulose	2.30	2.10
Common salt	3.23	4.95
Ash	6.80	1.08

The analysis of ground peanut cake is thus given by Bolton and Revis. (Fatty Foods, 1913, p. 204).

Moisture	10.68
Oil	5.81
Carbohydrates	30.49
Proteids	45.12
Fibre	3.84
Ash	4.06
Sand	0.23

This represents the natural and unroasted nut, decorticated.

Peanut butter is a highly nutritious and wholesome food material; and so far as this examination goes, it appears to be furnished, to the Canadian consumer, without any adulteration. This is the first occasion upon which the article has been subjected to inspection by this department.

BULLETIN No. 377—HUMAN FOOD, CONSIDERED IN ITS RELATION TO QUANTITY AND COST.

OTTAWA, June 12, 1917.

It is pleasing to know that there exists a large class of Canadians of sufficient means to choose their food without regard to its market cost. Their selections are guided solely by considerations of palatability, nutritiveness and fashion, which generally means strawberries in winter, and unseasonableness throughout the year. It is not for people of this class that I am writing.

A very much larger class of our people is compelled, in these days of high prices, to consider somewhat closely the cost of food; and perhaps the largest class of all finds it necessary to reduce expenditure in matters of education, clothing and amusements in order to pay the grocer's and butcher's bills.

It may seem audacious in me to say that I am convinced that a very little elementary knowledge of well ascertained facts concerning the meaning of nutrition, and the actual utilization of food in the maintenance of life, might reduce the cost of our food fully fifty per cent, without any sacrifice of physical well-being. I have, however, given this matter very careful study, and I do not hesitate to make the above statement, quite deliberately.

Where then lies the difficulty in effecting this economy? Just here, that in order to practical results, the modicum of knowledge above referred to must be possessed

not by the university professor, or even by the student, but by the average housewife, to whom is entrusted the marketing and the cooking of our food.

This brief essay is therefore addressed to the housewife, and is intended to be perfectly comprehensible by those who have had no formal or academic training in chemistry or biology, or any other of the sciences with whose results it deals. As far as possible, I shall avoid the use of unfamiliar terms; and if exactness of statement must thereby suffer, I shall nevertheless assure the reader of a sufficient degree of accuracy to justify her confidence, and to ensure useful results.

SOME PRELIMINARY CONSIDERATIONS.

One man lives essentially on bread and milk, another on meat, potatoes and water. Both are healthy and apparently well nourished. We look at these men, examine them carefully, and find that, so far as we can judge, they are made of the same stuff. Had we no other source of information than our own observation we should find it impossible to say which man was made of bread and milk, and which of meat and potatoes. Even when subjected to the most thorough medical inspection, it is found that flesh, bone, blood, skin, cartilage, secretion and all other detail, are essentially alike in each.

Here surely is food for thought; and it ought to be perfectly evident that the food eaten by each, however different in name and in appearance, must have some common character; it is in each case, capable of transmutation into body material. And the special foods named are only particular cases of scores of purchaseable foods which could have effectively replaced them.

It must be sufficiently evident that, leaving out of account those foods which we eat, not because we need them, but simply for the pleasure of eating, food is needed for two main purposes—first, to build up the material of the body and to replace tissue which is wasted in life processes; second, to furnish energy, or the power to do work. For the human body is a machine in action; and like any other machine, must undergo constant repair, and be furnished with some motive power, in amount proportioned to the work it is required to perform. This power to do work, we call *energy,* and in order that we may speak definitely about energy we must have some unit of measurement of energy. When we want to speak of distance, we say so many miles; or of weight, so many pounds. In the case of energy, we use the *calorie* as our unit. It is not at all necessary to know that a calorie is the equivalent of an amount of energy, in the form of heat, that is required to raise the temperature of 1 litre of water through 1 degree Centigrade. It makes our thinking all the more definite to know this, as it does to know that a pound is 7,000 grains; or that it is the force of gravity at a certain latitude, acting upon a mass of platinum carefully preserved in the archives at Westminster. But such exact knowledge is quite unnecessary for our purposes. If I am travelling in Russia, where they measure distance in versts, and I am told that my rate of travelling is, 30 versts per hour and my destination is 300 versts distant, I can just as well calculate the time at which I shall reach home, as I would do if I knew what a verst actually was in yards or miles. Fix in your mind the term *calorie* as a measure of energy; and don't bother about its complete significance.

But remember that a man of 156 pounds weight, lying quietly in bed all day, requires to be supplied with 1,848 calories of energy if at the end of the day he is to be as well and strong as he was in the morning. If he sits up in a chair, all day, he will require 1,996 calories of energy, because the sitting posture demands more muscular effort; and if he moves about the house, or is at all fidgety, he must have 2,160 calories. A hospital patient of 156 pounds weight, must have more than this if he is to grow stronger, for the numbers given do not allow of added vitality, but merely the maintenance of initial vitality. If our man is to do any kind of work, he must of course, be supplied with additional calories of energy; and Rubner, the great German

authority on this subject finds an average of 2,445 calories requisite for such men as writers, draughtsmen, tailors, physicians, etc.

Actual computations of the diet of farmers, maintained in good health show the following:—

	Calories.
Farmers in Connecticut	3410
" Vermont	3635
" New York	3785
" Mexico	3435
" Italy	3565
" Finland	3474
Average	3551

(Lusk. Fundamental Basis of Nutrition.)

Lusk says: From the present available data one may estimate the daily energy requirement of a well-nourished adult (156 pounds) as follows:—

Occupation.

	Calories.
In bed 24 hours	1680
In bed 8 hours, work involving sitting in a chair 16 hours	2170
Bed 8 hours, in a chair 14 hours, moderate exercise 2 hours	2500
Farmers	3500
Rider in a 6-day bicycle race	10000

I want to impress upon you the importance of thinking in terms of calories when you are dealing with what we call vital energy. When you ask your friend "How do you do, to-day?" you are really asking him whether the energy that he expends in his daily life work is satisfactorily replaced by the energy that he derives from his food. If this is not the case, then he is starving.

Starvation.—Every human body, in a good state of health, represents a certain fixed income and outgo of energy, which we call the normal. If excess of food, more than requisite to maintain this normal is supplied, one or more of several things must happen. (1) The excess food may pass through the body unchanged or practically so—in which case waste occurs, and worse than waste; for a certain amount of energy must be expended to carry this overplus through the body; (2) The excess food may be digested and assimilated (metabolized) and what we call growth results. The body becomes bigger and heavier, and, if this growth be normal, as in the case of children and young people, all is well. (3) The excess food may be changed into fat, and more or less fat may be deposited in the tissues. Up to a certain point this is a good thing. The fat represents a storage of energy (potential energy) that may serve a good purpose on occasion; just as a bank deposit, representing money of which you have no need at the moment, may come to be useful, when your debtors do not come to time, and enable you to meet your obligations. But this deposition of fat may go to excess; and by creating layers of fat in the muscles, may so weaken them, that they can no longer work efficiently. For example, the heart is a muscle, and what is called fatty degeneration of the heart, always fatal, is merely the result of too much fat deposition in this muscle.

If too little food be taken, then, as long as expenditure of energy goes on and it has already been shown that an expenditure amounting to 1,680 calories, in the case of an adult of 156 pounds weight goes on in every 24 hours, even though the person lies quietly in bed the whole time, there must be a deficit at the end of each day, and the individual undergoes starvation. If he possesses a considerable store of surplus energy, as fat, this store will be drawn upon. The body will lose weight, but the loss is something that can be spared without serious harm. When this store of fat is used up,

energy can still be obtained, but it will now be derived from the actual body tissue and the body will waste away to the point of exhaustion and death. This is of course, the worst kind of cannibalism for the man is consuming, as food, the material of his own body. Death results when the weight of the body is reduced to two-fifths of its original weight (Chosat). This, of course, refers to death by simple starvation, and apart from all disease.

All foods provide energy. A substance taken by the mouth, which does not furnish energy, is not, in the true sense, a food. We do, as a matter of fact, take in many such substances with our food, chiefly for the purpose of sweetening it (saccharin) or of giving it a pleasant flavour (spices, etc.). One substance, which is not in the strict sense a food, we must have in considerable amount. I refer to water. Sixty-three per cent of the total weight of the human body consists of water. Practically all foods as prepared for the table, consist largely of water. This is especially the case with soups, stews, puddings, porridge, etc., and many market foodstuffs, which we do not think of as containing water, nevertheless contain large amounts of it. Thus, average beef contains 15 per cent; fresh fish about 30 to 40 per cent; bread, 33 per cent; potatoes, 76 per cent; cabbage, 90 per cent.

But water must be taken to a greater or less extent by itself, in addition to that which is incorporated with our ordinary table dishes. We must keep in mind that most of the waste products of life (chlorides, urea, uric acid, phosphates, etc.) are got rid of by the use of water as a solvent.

Fortunately, the consumption of water does not enter largely into the question of the cost of food, so that I need say nothing further about it than that we are not likely to use too much of it as a beverage, while most people use decidedly too little.

All foods, properly so called, may be divided into two classes:—

1st. Those which contain material capable of building up the tissues of the body (muscle, bone, cartilage, etc.) in addition to being able to furnish energy. To this class of foods the term *proteids* is applied.

2nd. Those foods which, practically, supply energy only. It is necessary on account of the way in which the body works in changing food into energy, to subdivide this class into two subclasses, known as *Fats and Carbohydrates.*

Fats and carbohydrates are capable, to some extent, of replacing each other without serious impairment of the bodily functions; but neither subclass can totally replace the other without disastrous results.

These three terms, proteids, fats, and carbohydrates, must be constantly borne in mind, if any useful application of scientific knowledge is to result. Some examples of typical foods of each class may be given to assist in memorizing the terms.

Proteids.—The white of egg, skim-milk cheese and gelatine are illustrations of food material essentially of proteid character. Among foods which do not altogether consist of proteids, but are chiefly valued because of their proteid content may be mentioned all kinds of meat and fish; gluten bread, condensed skim milk, and macaroni.

All proteids are not of equal value in nutrition, but although the differences are considerable, it would be entirely beyond the scope of this paper to enter into details.

What is of prime importence to be remembered is the fact that on an average, every ounce of proteid is capable of producing 116 calories of energy, when digested and assimilated as food (calculated from 1 gramme=4·1 calories). This number will be frequently made use of in what follows, and should be remembered.

Fats.—This term is quite generally understood, and must be taken to include all fats of whatever origin. For although small differences exist between the food values of fats derived from animal sources (butter, lard, tallow, etc.) and those of

vegetable origin (olive oil, cocoanut oil, cotton seed oil, etc.) these differences are so small as to be negligible for purposes of this study.

Every ounce of fat, properly digested in the body, produces 264 calories of energy, and this number must be fixed in the memory.

Carbohydrates.—This term includes the various starches (wheat, rice, potato, oatmeal, etc.) and also sugars (ordinary sugar, syrup, honey, etc.)

The energy value of carbohydrates is identical with that for proteids, namely 116 calories per ounce; but carbohydrates, unlike proteids, do not contain material for building up the framework of the body.

I have already pointed out that life processes demand exepnditure of energy and that, if these processes are to be continuous, there must be a continuous supply of energy, by means of food.

For a man of average weight, engaged in ordinary work largely sedentary during 10 hours of every day, it has been shown that a daily expenditure of energy measured as 2,500 calories is involved; while for a man engaged in arduous work (such as farming) 3,500 calories are needed.

For a woman. it has been established that approximately four-fifths of the above amounts of energy are expended.

But it is not enough to know the total energy as must be evident by considering that fats and carbohydrates while supplying large amounts of energy, do not supply the body-building elements. If the framework of the machine is not kept in repair, it cannot be expected to do its work no matter how much power is supplied to it. Indeed; the more energetically we insist on driving a machine, any of whose parts are out of adjustment, the sooner shall we wreck it altogether.

This phase of the matter has also been studied very carefully by physiologists; and perfectly definite results are on record. The most important generalization is that of Professor Voit, who is recognized as the highest authority upon this subject. According to Voit, the daily diet of a man engaged in work requiring an expenditure of 2,810 calories of energy, should be in the ratio:—

Proteids: Fats, Carbohydrates: = 4·162: 1·975: 17·637, and for a woman requiring 2,240 calories, the ratio should be:—

Proteids: Fat, Carbohydrates: =3·316: 1·587: 14·110.

These ratios represent parts by weight, and are intended to apply to the food of persons who must economize in expenditure to the lowest limit at which health can be maintained.

It will be noted that the amount of fat is in each case about one-ninth of the amount of carbohydrate. This is acknowledged to be undesirably low; and is suggested with a view to the utmost economy, fat being the most costly food constituent. The lower class of the German peasantry use a diet of the kind indicated. Among the wealthy classes of Germany, however, the ratio of fat to carbohydrate was found to be 1 to 3 or 4 instead of 1 to 9. I have already stated that while fats and carbohydrates cannot replace proteids in the diet, they may to a large extent, replace each other. Where utmost economy is necessary, of course, the fat component of the diet, as being the most costly, will be reduced to its lowest terms, and the carbohydrate correspondingly increased. There is a limit below which this cannot be done, if health is to be maintained, and the above quoted ratio fixes this limit. It is regrettable that food fat in palatable form, should be so costly. Wherever possible the fat should be increased, and the carbohydrate correspondingly decreased.

It is notoriously the case that the greater part of the fat in lamb and mutton chops, sirloin steak, and the best cuts of all kinds of meats, is not eaten, and is too often wasted. The butcher leaves this fat on the chop or steak, partly as evidence that the meat is derived from a well fatted carcass, and partly because he gets a better

price for it, when sold at the price of chops or steak, than he could secure by selling it simply as fat. The ordinary man has no appetite for the excess of beef or mutton fat supplied in the form of cooked steak or chop. Here is a distinct waste of valuable food material, a waste which amounts to millions of dollars every year. This excess of beef and mutton fat should be worked up into palatable form, a matter which could be easily accomplished by well known methods of manufacture.

This aspect of the matter is so very interesting that I am tempted to introduce some statistics, by way of illustration. The following represent actual dietaries upon which the individuals, representative of the classes to which they respectively belong, maintained a working vitality. They are quoted from Hammarsten's Physiological Chemistry, as translated by Mandel; and are not to be understood as other than selected instances of actually investigated cases, introduced for illustrative purposes. I have merely converted Hammarsten's statements, which are given in grammes, into ounces in order that they may be more intelligible to my readers.

Examples of the daily quantity of food in specific individuals and the calculated energy represented by this food.

Quantities in ounces Avoirdupois. *Energy* in calories.

	Description.	Proteids.	Fats.	Carbo-hydrates.	Calories.
1	Soldier during peace	4·197	1·411	18·659	2784
2	Soldier in light service	4·127	1·235	15·768	2424
3	Soldier in the field	5·150	1·623	17·778	2852
4	Labourer at work	4·586	1·411	19·400	2903
5	Labourer at rest	4·832	2·540	12·416	2458
6	Cabinet maker (40 years)	4·621	2·398	17·425	2835
7	Young physician	4·480	3·171	10·143	2602
8	Young physician	4·727	3·598	10·300	2476
9	Labourer	4·691	3·351	14·885	2902
10	English smith	6·208	2·505	23·492	3780
11	English pugilist	10·159	3·104	3·280	2189
12	Bavarian woodman	4·762	7·337	30·900	5589
13	Silesian labourer	2·822	0·564	19·471	2518
14	Seamstress in London	1·904	1·023	10·300	1688
15	Swedish labourer	4·727	2·787	17·108	3019
16	Japanese student	2·928	0·494	21·941	2779
17	Japanese shopman	1·940	0·212	13·898	1744
18	Eskimo (Krough)	9·947	1·443	1·792	2604
19	Bengali	1·834	0·907	16·649	2390

A little intelligent attention given to this record will be well repaid; and I would particularly ask you to note the following points.

Nos. 1, 2, 3. The soldier in the field receives a decidedly better ration than in peace, or on light service. The increase is most notable in proteid and fat; but whether in barracks or in the field his ration is adequate; and is practically that recommended by Voit for a man of about 150 to 160 pounds weight. The proportions of each constituent are approximately correct, with exception of the fat, which is distinctly too low. This is undoubtedly a matter of economy and cannot be scientifically justified.

Nos. 4 and 5. It should be understood that the weight of the body must be taken into account in all computations of a proper ration. I have not the body weight of the individual here reported. He has more fat when at rest than when at work, which is distinctly not as it should be. Probably when on holiday, he is able to indulge in butter to an unusual extent. His excess energy demanded by labour is derived from increased carbohydrates, the cheapest source of energy.

No. 6 is fairly well nourished.

Nos. 7 and 8. Professional work does not make such strenuous demands for expenditure of energy. It is usually better paid; hence the possibility of supplying a larger proportion of it by the consumption of relatively expensive fats.

No. 9. This labourer is better nourished than No. 4, although the energy furnished by his food is identical with that of No. 4. A much larger proportion of it is supplied by fat.

No. 10. It is evidently a big man, expending much energy. The proportion of fat in his diet is decidedly too small.

No. 11. The pugilist in training is putting on muscle. He is supplied with large excess proteid matter, and carbohydrates are kept down as much as possible. This is not a normal ration, but one suited to a special end.

No. 12. Is amply supplied with energy for very severe work. Such a ration could not be tolerated by any other than a strong man, very actively employed.

No. 13. Evidence of poverty is given by the reduction of fat in his ration.

No. 14. A clear case of under nutrition. One is reminded of the "Song of the Shirt."

No. 15. A good ration, for light work.

No. 16. Diet chiefly rice, and sadly lacking in fat.

No. 17. Emphatically under nourished. It must, however, be remembered that Nos. 16 and 17 are probably cases of very small men.

No. 18. Great excess of proteids as compared with the other food components. It must, however, be kept in mind that climatic and food conditions are not comparable in the case of the Eskimo, with those obtaining in temperate climes.

No. 19. As contrasted with No. 18, the difference between life in Hindustan and Greenland is very evident.

APPLICATION.

If what has been said is clearly apprehended, it remains but to emphasize the fact that the lowest satisfactory ration for the average man, engaged in ordinary work, must contain about 2,800 calories of energy, and for a woman about 2,240 calories; and that this amount of energy should be supplied by proteids, fat and carbohydrate food, in the ratio of 4·162 ounces, 1·975 ounces and 17·637 ounces, respectively, in the daily diet of man; and 3·316 ounces, 1·587 ounces and 14·110 ounces for women.

A better diet, for those who can afford it, results from an increase in the fat content, and a corresponding decrease in the carbohydrate content.

These are rather awkward numbers to bear in mind, and it is not necessary in actual life, that we should work so close to the theory. Especially is this the case when we remember that complete utilization of the food eaten, seldom or never occurs; nor can we expect every sample of any one kind of food to be strictly similar to every other. The average values of all ordinary food materials, stated as proteids fat and carbohydrates, have been very carefully determined. Full milk cheese, for example, as calculated from the examination of very numerous samples, contains 23 per cent proteids, 27 per cent fat and 4 per cent, carbohydrates; while skim-milk cheese contains 33·4 per cent proteids, 6·6 per cent fat, and 5 per cent carbohydrates, the difference in each case, being made up of mineral matters and water, which we do not recognize as food for our present purpose. But individual samples of cheese will vary from these averages by amounts that remain unknown to the consumer. The same thing is true of meats, fish, breads, and all other forms of food.

The individual variations must, for our purpose be left out of consideration in constructing a ration and we must agree to accept the best available averages as our guides. If we buy only honest and unadulterated food, we may feel reasonably sure that its energy equivalent will not depart very largely from the values given in the

following table. Remembering what has been said, it will be sufficient to take the following ratios, as defining the rations indicated.

Cheapest Satisfactory Daily Ration.

For man, of average weight (150-160 pounds) :—

Proteids, 4·2 oz.; Fats, 2 oz.; Carbohydrates, 18 oz., energy equivalent=2,903 calories.

For woman of average weight:—

Proteids, 3·5 oz.; Fats, 1·6 oz.; Carbohydrates, 14 oz., energy equivalent=2,452 calories.

A Better Ration would be:

For men, proteids 4·2 oz.; Fats, 3oz.; Carbohydrates, 16 oz., energy equivalent= 3,135 calories.

For women: Proteid, 3·5 oz.; Fats, 2 oz.; Carbohydrates, 15 oz., energy equivalent =2,674 calories.

If we know the proteid, fat and carbohydrate value of every market-food, we can, with a good degree of exactness calculate the amounts of the various foods needed to furnish any desired ration; and if in addition to this, we know the market prices of the different materials, we are able, by very simple calculations, to determine the cost of such ration; and to vary its cost according to changes in market prices, without changing the food value of the ration, that is its energy producing value, which is the main consideration in the case of most of us.

A few examples will suffice to indicate the process.

Each one pound avoirdupois of the following foods, contain the stated number of ounces of proteids, fats and carbohydrates respectively.

The numbers given have been re-calculated from the percentage numbers tabulated by Kœnig in his great work "Chemie der Menschlichen Nahrungs und Genussmittel" 4th edition.

In most cases they are averages from great numbers of analytical determinations; and although individual specimens of any particular food may vary considerably, from these averages, we may confidently accept them as representing the true food content, when more than one or two purchases are taken into account.

Each 1 lb. avoirdupois of the food named contains.	Proteids ounces.	Fats ounces.	Carbo-hydrates ounces.	Cost of 1 lb. Ottawa, June, 1917.	Remarks.
Beef—Brisket	3·056	1·996	0	·16	Best.
" flank	2·768	4·128	0	16 to 12·5	1st & 2nd cuts.
" loin	2·928	3·120	0	·35	
" sirloin	3·024	2·832	0	·35	
" tenderloin	2·496	3·904	0	·75	
" ribs	2·736	4·080	0	·28	
" roundsteak, best	3·264	1·600	0	·32	
" roundsteak, second	2·816	3·808	0	·25	
" foreshank	3·280	1·440	0	·10	
" hindshank	3·248	1·520	0	·10	
" tongue	2·784	2·880	0	·25	
" heart	3·088	2·128	0	·12·5	
" liver	3·216	0·880	0	·15	
" kidney	2·624	0·848	0	·18	
Veal leg	3·296	0·944	0	·22	Whole leg.

Each 1 lb. avoirdupois of the food named contains.	Proteids ounces.	Fats ounces.	Carbo-hydrates ounces.	Cost of 1 lb. Ottawa, June, 1917.	Remarks.
Veal cutlets	3·120	1·632	0	·32	
Mutton – average	2·736	0·928	0	25 to 30	
Lamb – average	2·848	3·616	0	·15, 25, 30	
Pork – fat	2·320	5·968	0	·34	
Pork lean	3·248	1·088	0	·32	
Pork ham	2·960	2·832	0	·34	
Blood – various sources	2·896	0·032	0		None.
Blood from fatted beef	3·544	0·160	0		None.
Rabbit – whole	3·344	0·160	0	·10	
Hen – flesh	3·408	0·728	0	·25	
Salmon	3·157	1·718	0	·30	
Fresh Herring	2·578	1·355	0	·10	
Mackerel	3·090	1·293	0	·18	
Cod	2·675	0·048	0	·12 ·5 & ·16	
Haddock	2·709	0·042	0	·10	
Dried Codfish	13·046	0·118	0	·10	
Dried & salted codfish	11·579	0·395	0	·10	
Smoked Haddie	4·331	0·058	0	·15	
Smoked & salted herring	5·882	2·518	0	·10	Red herring.
Sardines	4·544	1·291	0	·32	
Oysters	1·581	0·304	0		None.
Caviare	4·694	2·237	0		None.
Lobster	3·054	0·156	0	·40	
Beef, dried (pemmican)	11·120	0·934	0		None.
Beef, corned	3·469	0·778	0	·18	
Sausages, frankfurters	2·002	6·258	0		None.
Sausages, Blood	1·739	1·628	3.274	·12·5	Containing cereals.
Eggs, Hens	2·068	1·938	0	·26	
Milk, whole milk	0·546	0·606	0.784	·04	
" skimmed	0·422	0·139	0.758	·02	
" condensed, no sugar	1·737	1·827	2.234	·20	
" condensed sugared	1·290	1·533	8.450	·20	American.
" condensed sugared	1·673	1·611	8.163	·20	American and foreign.
Milk skim – sugared	2·034	0·421	9.037		
" powder, whole milk.	3·694	3·702	6.782		
" powder skimmed	4·930	0·279	8.549		
Cream	0·659	3·810	0.627	·25	
Butter	0·122	13·392	0·080	·42	
Oleomargarine	0·158	14·014	0		None.
Cheese—Cheddar	4·362	5·080	0.538		
" American	4·118	5·482	0.390	·30	
" average quality	4·194	4·729	0·542	·30	
" skim milk	5·694	1·992	0·675		None.
" Roquefort	4·235	5·300	0·412		"
Buttermilk	0·626	0·163	0·678	·02	
Infants' Foods, Ridge's	1·392	0·221	13·046	1·00	
Infants' Foods, Mellin's	1·250	0·046	13·213	1·20	
Infants' Foods, Neave's	2·112	0·272	12·494	0·50	
Wheat Flour – Fine	1·709	0·180	11·950	·09	
Wheat Flour – coarse	1·856	0·254	11·742	·08	
Wheat Flour – whole	1·509	0·150	12·147	·07	
Rye Flour.	1·529	0·230	11·824	·07	
Oatmeal	2·219	0·989	10·739	·07	
Cornmeal	1·539	0·402	11·472	·07	
Buckwheat flour	1·325	0·238	11·933	·08	
Pea meal	4·115	0·285	9·149		None.
Macaroni	1·741	0·099	12·088	·10	
Rice flour	1·183	0·110	12·652	·10	
Corn starch	0·192	0·002	13·618	·13	
Sago "	0·346	0	13·085	·16	
Tapioca starch	0·118	0·026	11·498	·16	
Potato starch	0·141	0·008	12·909		None.
Bread wheat, fine	1·090	0·086	9·248	·07	
Bread wheat, coarse	1·150	0·146	8·158	·06	
Bread Graham	1·296	0·115	8·533	·06	
Wheat biscuits	1·586	0·408	12·464	·20	
Rye bread	1·029	0·182	8·069	·07	
Oatmeal cakes	1·373	1·664	10·669		None.
Potatoes	0·318	0·024	3·338	·055	
Artichokes	0·302	0·029	2·624		None.
Sweet potatoes	0·251	0·080	3·861		"

Each 1 lb. avoirdupois of the food named contains.	Proteids ounces.	Fats ounces	Carbo-hydrates ounces.	Cost of 1 lb. Ottawa, June, 1917.	Remarks.
Beets – Mangold.	0·202	0·021	1·381		None.
Beets – sugar	0·198	0·016	2·427	·20	
Carrots	0·189	0·046	1·450		
Turnips—Swedes	0·222	0·029	1·179		None.
Melons	0·134	0·021	1·016	·04	
Cucumbers	6·174	0·018	0·354	·10	
Pumpkins	0·176	0·021	1·024		None.
Tomatoes	0·154	0·030	0·638	·20	
Green peas	1·054	0·083	1·989		None.
Green beans	0·435	0·022	1·056		?
Asparagus	0·312	0·022	0·384	·02	
Cabbage	0·288	0·032	0·606	·07	
Cauliflower	0·397	0·054	0·728	·50	
Spinach	0·594	0·008	0·578	·07	
Lettuce	0·226	0·050	0·350	·075	
Onions	0·256	0·024	1·661	·08	
Canned peas	0·578	0·134	1·344	·10	
Baked beans	1·144	0·510	2·822	·15 to ·20	None.
Sugar corn	9·458	0·200	2·973	·12	None.
Succotash	0·565	0·139	2·808		
Sauerkraut	0·200	0·086	0·616		None.
Mushrooms	0·781	0·032	0·571	·90	
Apples	0·048	0	1·416		None.
Pears	0·056	0	1·488		"
Plums	0·162	0	2·477		
Grapes	0·162	0	2·421		
Oranges	0·173	0	0·808	·07	
Dried apples	0·227	0·310	7·726	·13	
Dried apricots	0·494	0	4·138	·18	
Raisins	0·403	0·094	10·843	·15	
Dried figs	0·573	0·203	8·342	·10 to ·20	
Sugar	0	0	15·531	·09	
Corn syrup	0	0	12·866	·19	
Honey	0·227	0	12·032	·15	
Black pepper	1·955	1·243	6·019	·40	
White pepper	1·877	1·053	8·704	·45	
Coffee—roasted	2·261	2·216	9·572	·40	
Tea	3·861	1·318	?	·30 to ·60	
Cocoa	3·523	4·536	2·899	·40 to ·50	
Peanut butter	4·392	7·608	2·102	·23	
Rolled Oats	1·893	1·058	11·416	·09	
Rolled Wheat	1·403	0·304	12·355	·10	
Shredded Wheat	1·845	0·136	12·242	·20	
"Force"	1·622	0·242	12·301	·24	
Peas dried	4·344	0·350	8·632	·08	

This table might be almost indefinitely extended, and I could wish it to include every available form in which our markets offer food material. Even as here published it will serve to enable us to apply to the cost of food the principles which I have attempted to present in what has been written. The prices quoted are, of course, subject to frequent change; and economical buying involves a constant watching of the local market.

It is desired to ascertain the lowest cost of satisfactory nutrition in case of a family comprising, let us say, three men, of about average weight (150 to 160 lbs.) and two women.

Referring to page 10, it will be seen that this involves the furnishing of:—

For the men:	Proteids 12·6;	Fats 6·0 oz.;	Carbohydrates 54 oz.
For the women:	" 7·0	" 3·2	" 42
Total	19·6	9·2	96

Total energy required is 15,838 calories. (From proteids x 116; fats x 264; carbohydrates x 116.)

From the table on pp. 11-12, we find that the necessary proteids may be furnished in many different ways. In choosing certain foods as sources of proteids we incidentally introduce fats, or fats and carbohydrates at the same time; and as a balanced ration is demanded, a certain amount of patience, ingenuity and intelligence is involved. The matter is, however, really very simple; and the thought which must be given to the solution of the problem, should make it all the more interesting to the intelligent housewife.

I here present a few of the numerous solutions of this problem.

Food Materials.	Quantity. Lbs.	Proteids. Oz.	Fats. Oz.	Carbohydrates. Oz.	Cost.
Oatmeal	2	4·438	1·978	21·460	14
Graham bread	4	5·184	0·460	34·132	24
Milk-whole	5	2·730	3·030	3·920	20
Sugar	1	0	0	15·531	9
Beef (brisket)	3	9·168	5 988	0	48
Potatoes	2	0·636	0·048	6·676	11
Corn starch	1	0 192	0·002	13·618	13
Total	18	22·348	11 506	95·337	$1 39

This ration shows the following departures from the calculated amounts:—

Proteids..... 2·748 oz. excess.
Fats..... 2·306 " "
Carbohydrates.. 0·663 " deficiency.

The energy value is:

Proteids.....	22.348 × 116 = 2592·368	calories.
Fats.....	11·506 × 264 = 3037·584	"
Carbohydrates..	95·337 × 116 = 11059·092	"
Total	16689·044	"
Calculated	15838·000	"
Excess.....	851·044	"

On the whole this is a sufficiently close approximation to theoretical requirements, and since a little waste is almost unavoidable in cooking and serving, it may be regarded as satisfactory.

The cost is $1.39 for 5 people per day.

Here is another attempt at solution:

Food Materials.	Quantity. Lbs.	Proteids. Oz.	Fats. Oz.	Carbohydrates. Oz.	Cost.
Ham	1	2·960	2·832	0	34
Eggs	1	2·068	1·938	0	26
Bread (fine)	4	4·360	0·344	36·992	28
Butter	½	0·061	6·696	0·040	21
Milk	3	1·638	1·818	2·352	12
Codfish	3	8·025	0·144	0	45
Sugar	1½	0	0	23·297	13½
Corn starch	1	0·192	0·002	13·618	13
Total	15	19·304	13·774	96·299	$1.92½

This ration shows the following departures from calculated amounts:—

Proteids	0·296	deficiency.
Fats	4·574	excess.
Carbohydrates	0·298	"
Energy value	17046	calories.
Calculated	15838	"
Excess	1208	"

The cost of this daily ration is considerably more than in the first case, due to introduction of more fats. The total energy value is, however, but slightly enhanced.

It may be worth while to illustrate by a third calculation, in which we shall endeavour to secure the necessary amounts of food at the lowest possible cost.

Food Materials.	Quantity. Lbs.	Proteids. Oz.	Fats. Oz.	Carbohydrates. Oz.	Cost.
Beef, shank	3	9·840	4·320	0	30
Bread, coarse	4	4·600	0·584	32·632	24
Milk, whole	4	2·184	2·424	3·136	16
Sugar	2	0	0	31·062	18
Oatmeal	1½	3·329	1·483	16·095	10½
Corn starch	1	0·192	0·002	13·618	13
Total	15½	20·145	8·813	96·543	$1.11½

This ration indicated a slight excess in proteids compensating a slight deficiency in fats.

The energy value is	15994	calories.
Theoretical requirements	15938	"
Excess	56	"

The total cost is only $1.11½.

It is scarcely necessary to say, that want of care in purchasing material might cause a ration, having no greater food value than the above, to cost two, three or four times the above amounts.

It should be noted that, while the food values assumed in the above rations, are sufficient to maintain energy in persons of average weight, and engaged in work which makes no severe demands, they must be regarded as minimum values, and make no allowance, for unusual fatigue, for waste in use of the food, or for that variety of choice in food materials which is absolutely necessary to prevent loss of appetite. It will be especially apparent that the relation of fats to carbohydrates is kept as low as possible, for the sake of reducing cost.

Statistics prove that the German peasantry are, in large part, fed upon a ration of this character; and I have no doubt that if other countries had accumulated similar, carefully obtained statistical information, it would have proved much the same thing in their cases.

The prolonged use of a diet so relatively poor in fat, results in physiological disturbances which ultimately break down the system and induce disease. The comprehensive word which describes this condition is "indigestion" or "dyspepsia" and its expression in face and form and temper is so apparent in the experience of every one as to need no emphasis here. The proteid content of the above rations is also too low; and I may quote the following from Professor Rubner, an authority in the field of nutrition study: "The diet of the upper classes is the only one which provides the pleasures of the table; it is rich in proteid and fat; it is not voluminous, does not

overburden the stomach, tends less to obesity than any other diet, keeps the body even of a lazy man in good condition, and does not overwork the digestive functions. The less well-to-do, reduce, of course, the amount of meat, using in its place bread and potatoes."

I have already referred to the desirability of increasing the relative proportion of fat in our diet, and have recommended the ratio, Proteids: Fats, Carbohydrates: 4·2: 3: 16 as a decided improvement.

I shall illustrate a ration for our supposed family of 5 persons on this basis:—

3 men require	Proteids	12.6 :	Fats	9 :	Carbohydrates	48 oz.
2 women require	Proteids	7.0 :	Fats	4 :	Carbohydrates	30 oz.
Totals		19.6		13		78

This may be furnished by:—

——	——	Proteids.	Fat.	Carbohydrates.	Cost.
	lb.	oz.	oz.	oz.	cts.
Rolled Oats	1	1.893	1.058	11.416	9
Milk	3	1.638	1.818	2.352	12
Ham	½	1 480	1.416	0	17
Bread	3	3.270	0.258	27.774	21
Eggs	1	2.068	1.938	0	26
Round steak	2	6.528	3.200	0	64
Sugar	½	0	0	7.766	4½
Corn starch	½	0 096	0.001	6.809	6½
Lamb	1	2.848	3.616	0	25
	12½	19.821	13.305	56.087	$1.85

Energy furnished	14637 calories
Energy required	14754 calories
Difference	117 deficiency

I do not pretend to recommend in detail, any particular ration. The reader who has carefully studied what has been said, will have no difficulty in calculating very various rations from the data given; and it should furnish an interesting exercise to any one seeking household economy, to select, such combinations as will satisfy nature's demands, and at the same time form palatable dishes.

It is to be remembered that cooking has much to do with the appetizing character of food, and with its digestibility, consequently with its usefulness to the organism.

Many of the food materials given in the table are not practically available in the form in which they are purchased. This is the case with flour, lard, and others. These are rather to be regarded as constituents of food than as food itself. The housewife who makes tea-cakes, from flour, lard, etc., can easily calculate the food value of her product, as well as its cost, if she weigh in the ingredients, and also weigh the finished article. The food value of a complex cake if properly baked, is exactly the sum of the food value of the ingredients.

Several matters of importance in this connection, can only be mentioned here. To deal fully with them, would too greatly extend this essay; and would distract attention from the single purpose for which this has been written; namely the importance of giving attention to the nutrient value of our food; and the outlining of a simple method of calculating this value, and of correlating it to the actual cost of available food materials.

Briefly, the matters referred to are the following:—

1. Many foods and food materials are on the market in patented or proprietary forms. As a rule, these particular foods are very desirable; frequently they are the choicest forms in which the special article can be purchased. But they are relatively costly, and, regarded from the simple standpoint of nutrient value, they cannot be recommended to housewives whose main object in buying is to secure maximum food value at lowest cost. And it is mainly for this class that I have written.

2. I have not specially considered a dietary for children or for growing youth. The subject is too large to be dealt with usefully within my limits. As a rule, it may be accepted that a somewhat larger proportion of proteid food is required where the body tissues are increasing; that is, where growth is taking place; or in the case of convalescents, where waste is being made good.

3. The mineral matters of food have not been taken into account. Needless to say that these are of equal importance with nutrition as I have defined it. They are ordinarily present in our foods, and we take them incidentally and of necessity when we use natural food materials. In some cases, as where rice has been polished, or where flour has been ground from wheat after removal of the outer coating of the grain (bran) we are using an impoverished food material, and of course we must suffer, unless we supply the material which is lacking, by some equivalent food stuff. For this reason, true economy demands that we should prefer *whole wheat bread,* to the white bread so commonly in use.

4. An examination of the table herein will show that vegetables and fruit possess an apparently negligible value as nutrients. This is not, however, to be interpreted as rendering them useless in the dietary. We are so constituted as to require a certain proportion of non-nutritive material in our diet; if normal digestion is to proceed. In other words, our food must possess a certain bulk, as well as a definite nutrient value. Vegetables supply this bulk, and at the same time introduce certain small amounts of various acids and other components necessary to the enjoyment of our meals, and consequently to health.

5. Condiments, such as salt, pepper and spice, while possessing no nutrient values worth taking into consideration when we regard the minute amounts consumed, are necessary in order to give flavour to our food, and thus to stimulate appetite and the various secretions of the digestive system, through whose agency metabolism takes place.

6. Vitamines, are always present in natural foods, and food materials.

They greatly influence the efficiency of food, as regards growth, and the prevention and cure of disease, although in amount so small as to have escaped attention until quite recently. Any one desirous, of further information regarding Vitamines, may consult Public Health Report, Washington, Vol. 31 pp. 364 to 370; or a paper in the American Journal of Pharmacy for September 1916, p. 410.

In a recent address to the American section of the Society of Chemical Industry, Professor Graham Lusk of Cornell University recommended that, as far as possible, all foods should be purchased with a knowledge of their calorific and nutritive values, and that packed foods should be labelled with this information. I fear that such action would injuriously affect the sale of many high priced and extensively advertised forms of food.

BULLETIN No. 378—FERTILIZERS FOR 1917.

OTTAWA, July 25, 1917.

SIR,—I beg to hand you our usual annual report upon the inspection of Fertilizers as offered on Canadian markets. Three hundred and forty-nine (349) samples were procured by our inspectors during March, April and May, and these have been submitted to analysis with the following results:—

Samples found to meet their guarantee	322
" " to meet their guarantee, by compensating values	13
" " to meet guarantee as printed on the tag	2
" " doubtful	1
" " low in ammonia	4
" " low in phosphoric acid	6
" " low in both ammonia and phosphoric acid	1
Total	349

In the case of two samples (Nos. 55952 and 55976) the values are fully up to the guaranteed values as printed upon the accompanying tag; but these printed values are not in accordance with those registered in Departmental files. The purchaser sustains no loss, in such case; but the manufacturer has violated section 8 of the Fertilizers Act, which decrees as below:—

Section 8. "If a manufacturer elects to change the formula or composition of any fertilizer for which a registration number has been granted, he shall notify the Minister to that effect, and shall apply for a new registration number to designate the new or altered fertilizer, and the former registration number shall be cancelled, and shall not be reissued."

One sample (No. 55949) I have described as doubtful, because although it meets the guarantee as later filed at the Department, it was offered for sale and supplied to our inspector, before being granted a registration number. It is fair to state that no sale was effected, the sample not being charged for. Fertilizers must be registered, and the tag must state the specific registration number before they can be legally offered for sale (Sec. 5).

With few exceptions, the discrepancies between guaranteed values, and the values as found on analysis, are quite small; and I am justified in saying that in general, manufacturers of these articles are supplying goods which meet statutory requirements.

BULLETIN No. 379—BLACK PEPPER.

OTTAWA, July 3rd, 1917.

SIR,—I beg to hand you a report upon the examination of 345 samples, sold as Black Pepper.

These samples were purchased by our inspectors in January, February and March of this year and represent the article as supplied to the public throughout Canada.

Pepper, and especially Black Pepper, continues to be the most generally adulterated spice offered on our markets; a fact which may perhaps be due to its extensive

sale, which apparently makes it profitable to mix it with such various worthless articles as pepper shells and the dirt which adheres to these; ground olive stones, cocoanut shell and other similar sclerenchymatous cellular matters; and starches. The following synopsis gives the results of systematic inspection since 1876.

Bulletin.	Year of Inspection.	Kind.	Percentage of adulteration.
	1876 and 1877	White and Black.	83.0
	1878	"	70.0
	1879	"	50.0
	1880	"	43.0
	1881	"	66.6
	1882	"	69.0
	1883	"	65.0
	1884	"	71.0
	1885	"	57.3
	1886	"	51.3
	1888	"	69.0
20	1890	"	52.0
	1891	"	58.5
	1894	"	46.8
	1896	"	27.4
	1899	"	20.0
	1900	"	22.7
95	1904	"	55.4
103	1905	"	42.0
106	1905	Black.	45.9
106	1905	White.	31.7
165	1908	Black.	24.3
165	1908	White.	21.9
203	1910	Black.	17.9
203	1910	White.	17.1
248	1913	Black.	17.0
250	1913	White.	19.0
314	1915	White.	4.1
379	1917	Black.	13.9

While this record shows a great and a fairly continuous improvement in the character of the article since the earlier inspections, it leaves much still to be desired.

I am informed by certain grinders that it is not uncommon for them to receive orders from retailers to supply an article which can be profitably sold at a certain fixed price. The filling of such an order may necessitate adjustment of the amount of worthless material (filler) corresponding to the then prevailing price of actual pepper; and ground pepper has been known to be sold at a lower price than the unground article was then commanding.

The public should understand that in purchasing an adulterated article at a lower cost than that of the genuine, they are not effecting a real economy. The added material has no spice value, and it is certain to be present in such amount as to afford not only an offset to any apparent reduction in price, but an accompanying profit to the grinder.

The results of the present inspection may be stated thus:

Found to meet legal requirements	258	samples.
Found to be doubtful in character	30	"
Found to be legally adulterated	48	"
Found to be collected in error	9	"
Total	345	"

Although a limit of 7 per cent, for total ash in pepper is not legally established in Canada, this limit is generally accepted by other countries, and it is desirable that it should be made legal in this country also. Where pepper tissues only have been found, with total ash in excess of 7 per cent. I have in the meantime, judged the sample as doubtful in quality.

BULLETIN No. 380—HEADACHE POWDERS.

OTTAWA, July 6, 1917.

SIR,—I beg to hand you a report dealing with the examination of 102 samples sold as Headache Powders. These samples were procured by our inspectors in October and November of last year.

They may be classified as follows; on the basis of the active ingredient contained in them:—

Acetanilide (antifebrin)	81	samples
Phenacetin	13	"
Both acetanilide and phenacetin	2	"
Aspirin (acetosalicylic acid)	6	"
Total	102	"

Acetanilide continues to be the main drug in evidence. This is doubtless due to its relative cheapness, and to the fact that its potency makes it effective in smaller amount than either phenacetin or aspirin.

The respective doses prescribed by the British Pharmacopeia for these drugs are as below (Edn. 1914):—

Acetanilide	2 to 5	grains
Phenacetin	5 to 15	"
Phenazone	5 to 15	"
Aspirin	5 to 15	"

The medical advisers of this Department have fixed the following limits for the drugs named, having reference to interpretation of section 7 (c) of the Proprietary or Patent Medicine Act.

Acetanilide	2	grains
Phenacetin	5	"
Phenazone	5	"

This has regard to the presence of these drugs, without declaration on the package, one drug only being present in any case.

Where two sheduled drugs are present, each being in amount decidedly below permitted maximum, we interpret the above section of the Act as permitting the second drug in such amount only as may be considered complementary to that in which the first is present. For example, when one grain acetanilide is present 2.5 grains phenacetin may also be present; but no more.

Aspirin (acetosalicylic acid) is not specifically named in the Patent Medicine Act.

The results of analysis may be thus summarized:

Samples which meet legal requirements without declaration of drug	54
" which declare drug present	31
" Adjudged as doubtful	2
" Adjudged as adulterated	15
Total	102

One sample classified as *doubtful,* shows a decided excess of acetanilide in one powder, but another powder is within legal limits. The discrepancy may be due to carelessness in weighing out the material on the part of the manufacturer; and it is open to question whether or not such irregularity should be permitted to escape penalty.

The second sample so classified, declares the presence of *Antikamnia* which is a mixture of acetanilide with bicarbonate of soda. It is questionable whether or not the use of the term antikamnia may be accepted as tantamount to a statement that acetanilide is the active drug.

Adulteration consists in the presence of more than the permissable amount of the active drug, without declaration of the presence of such drug on the label.

We have made previous inspections of Headache Powders, as below:—

Bulletin No. 113—January, 1906	30 samples
Acetanilide found in	28 samples
Bulletin No. 230—Dec, 1911	150 samples
Acetanilide found in	118 samples
Bulletin No. 268—Sept, 1913	171 samples
Acetanilide found in	139 samples

BULLETIN No. 381—WHITE PEPPER.

OTTAWA, August 13, 1917.

SIR,—I beg to hand you a report upon the results of examination of 207 samples, sold as White Pepper. These samples were purchased by our inspectors in April, May and June of the present year.

The following is a summary of results:—

Found to be genuine	187	samples
Judged as doubtful, for reasons given below	4	"
Found adulterated under the Act	16	"
Total	207	

Two samples (5624 and 7341) contain wheat starch, in amount not exceeding about 5 per cent, and may be passed on the assumption that this foreign matter is present accidentally, and not with fraudulent intent.

No. 6873 contains excess of stone cells (Schlerenchyma), apparently, to some extent of foreign origin. These may have been added purposefully, but the sample has been granted the advantage of the doubt, as their specific nature has not been made out.

No. 77709 has an abnormally high ash for a white pepper. Legal limits for ash in pepper have not yet been established. Adulteration consists in the addition of foreign matter, thus reducing and injuriously affecting the quality and strength; and being an inferior or cheaper substance. Section 3, (a) and (b) of the Act.

Our last report upon White Pepper is contained in Bulletin No. 314 (May, 1915), and showed adulteration amounting to 4·1 per cent of a total of 387 samples. The present report shows 8·1 per cent. adulterated.

BULLETIN No. 382—LINIMENT OF CAMPHOR (Linimentum Camphoræ).

OTTAWA, August 16, 1917.

SIR,—I beg to hand you a report upon 94 samples of Liniment of Camphor, purchased by our inspectors in April, May and June of this year.

Orders for this collection were issued in March last, and 106 samples were returned;

The British Pharmacopœia (Edn. 1914) requires Liniment of Camphor to contain 20 per cent of camphor, dissolved in Olive Oil.

In India, and in the Eastern, African, Australesian and North American Divisions of the Empire, Arachis (pea-nut) or Sesame Oil, but no other oil or fat may be employed instead of Olive Oil.

The United States Pharmacopœia, Ninth revision (1916), prescribes the same percentage amount of Camphor, but directs Cotton Seed Oil to be used as the solvent.

Fifty-three (53) of the samples now reported are made with Cotton Seed Oil; and if judged by the formula of the British Pharmacopœia, are technically adulterated on this account. Nineteen (19) of these samples are genuine, so far as the content of camphor is concerned; and if judged by the formula of the United States Pharmacopœia, are strictly correct. There would appear to be no good reason for regarding cotton seed oil as in any way inferior to Olive Oil, in the preparation of this liniment, and I have judged these samples as genuine.

The following summary presents the result of our work:—

Samples collected by mistake	12
Samples liniment of camphor	94
Total	106

Liniment of Camphor.		
Made with Olive Oil	41	samples.
Made with Cotton Seed Oil	53	"
Total	94	"

Containing above 20 per cent. camphor	40	samples.
Containing above 18 per cent. camphor	15	"
Containing above 15 per cent. camphor	18	"
Containing less than 15 per cent. camphor	21	"
Total	94	"

The camphor content is the most important feature of this Liniment. Owing to the volatility of this component, and for the purpose of allowing reasonable variation in manufacture, the U. S. P. specifically permits the camphor content to vary from 19·5 to 20·5 per cent. The B. P. prescribes no limits of the kind.

Bearing in mind that this is our first systematic examination of the article, it may be permitted to accept samples containing at least 18 per cent of camphor as satisfactory; and perhaps those containing at least 15 per cent as doubtful; such judgments, however, are not to be regarded as precedents, for future decisions. If this suggestion be accepted the samples, as regards camphor content, may be classified thus:

Genuine, both as regards camphor content, and solvent	36
Genuine as regards camphor content	19
Doubtful	18
Adulterated	21
Total	94

As already noted, those samples which contain less than 18 per cent of camphor, (39 in number, or 41 per cent, of the total collection) are undoubtedly to be regarded as adulterated; although for this time passed as "doubtful" where as much as 15 per cent of camphor is present: and do not furnish the purchaser with a satisfactory article, or the physician with an effective remedy. Nine of them contain less than 10 per cent of camphor; and several of them considerably less than this amount.

I have on previous occasions found cause to remark upon the carelessness, or worse, exhibited by the retail drug trade in Canada; (See Bulletins 175,225, 265, 315,339,342, 344); and it is sufficiently evident that the Adulteration Act applying to the inspection of Drugs as well as Foods, must be enforced as vigorously in regard to the first named class of articles as to the latter. Whether or not the fact that most of our Apothecary shops are more truly described as Candy, Tobacco and nick-nack shops, has anything to do with the lack of attention given to quality of drugs proper, must be left an open question; but it is suggestive, and cannot be allowed to pass without remark.

BULLETIN No. 383—PACKAGED BREAKFAST FOODS.

OTTAWA, October 5, 1917.

SIR,—I beg to hand you a report upon 275 samples of so-called Breakfast Foods purchased by our inspectors throughout Canada in April, May and June of this year. The collection comprises apparently some fifty-one different sorts or brands of material.

The work of analysis was done in somewhat greater detail at Ottawa than at the sub-laboratories; for which reason I have arranged the results in two tables (I and II) the first showing results as obtained at the sub-laboratories upon 149 samples; the second giving results of work upon 126 samples at Ottawa.

It is necessary to note that the net weight of contents of the package has reference to the food content. Several packages contained such foreign material as crockery, and in these instances the weight of the article was deducted. Thus sample 75773 was guaranteed to contain 65 ounces as packed. It actually contained only 53·9 ounces of food, and a plate weighing 11·3 ounces. No. 68392 contained a saucer weighing 9·95 ounces, and No. 75729 a plate weighing 7·76 ounces.

The popularity of the foods now under discussion is undoubtedly due to four factors. (1) Attractive and wide-spread advertising, (2) A growing tendency to save time in the preparation of the meal, (3) the guarantee of cleanliness furnished by the manner of packaging, (4) the attractive flavour possessed by most of these foods.

It is further to be noted that all the foods in question are nutritious and appetizing; and where the question of cost, in relation to food value, is not of importance, they are to be highly commended.

It cannot, however, be denied that the cost of many of these foods, when considered in relation to the amount of nutriment contained in them, makes many of them decidedly expensive, and rather to be classed as luxuries than as staples, so far as regards that large class of consumers who are compelled by circumstances to consider expenditure.

The value of food, regarded from the standpoint of nutritive quality, is measured in terms of the calorie, which may be understood to express the amount of energy

derivable on digestion of food. A man of average weight engaged in comparatively light work, requires about 2,800 to 3,000 calories daily, in order to maintain health. If engaged in hard work, he must have more than this amount; say, about 3,500 calories. It must further be understood that no single food, (except perhaps milk in certain cases) supplies this energy in such a way that it could be made the sole diet of a healthy person.

In Table III, the results of this investigation are presented so that the reader may perceive the relation which exists between actual food value and cost. In the last column of this table is given the price, in cents, of that quantity of each food, which can furnish 1,000 calories of energy. The price used in making this calculation is the average price paid by our inspectors for the samples purchased irrespective of the place where purchased. Inasmuch as the cost price varies considerably in different localities, this fact must be taken into consideration where comparison of one food with another is instituted. Thus it will be seen, by reference to Tables I and II, that Kellogg's Corn Flakes have been purchased at prices varying from 12 to 27 cents per pound; Cream of Wheat at prices ranging from 11 to 15 cents per pound; Force, at prices varying from 16 to 38 cents per pound; Grape Nuts, at prices from 14 to 19 cents; and so on, of the others. It is difficult to understand why the local prices of standard foods should vary so greatly; but the fact remains. Freight charges doubtless affect the local price; and when the varying weight of the contents of packages, nominally of the same size, is taken into account, and calculated into cost per pound, this greatly affects the actual cost in many cases. Thus we find the net contents of packages of Kellogg's Corn Flakes to vary from 8 to 13·25 ounces; Force, from 7·5 ounces to 12·75 ounces; Post Toasties, from 12 ounces to 17·14 ounces, etc. Many other brands have a practically constant weight. Thus, in 15 samples of Cream of Wheat, the extreme weights are 27·25 ounces and 29·17 ounces; in 20 samples of Grape Nuts, the extremes are 12·75 ounces and 16·92 ounces; the great majority of the samples weighing close upon 15 ounces.

It is greatly to be desired that in all packaged foods the manufacturer should be required to state the actual weight of food contained in the package.

For the reasons above given, it must be understood that the subjoined cost prices for each 1,000 calories of energy obtainable from the special food named, may not correctly represent the cost of the food upon the Canadian market, considered as a whole. The prices given, do, however, correctly represent the cost of the food as indicated by the prices actually paid by our inspectors, for the particular samples analyzed.

1000 CALORIES OF ENERGY DERIVED FROM:—

	Cents.		Cents
Robin Hood Oats, large size costs	4.40	Malta Vita	8.59
Purity Oats, small	4.49	oman Meal, small size	8.75
Tillson's Oats	4.94	Kellogg's Rice Flakes	9.46
Quaker Oats, large size	5.00	Kellogg's Krumbles	9.50
Robin Hood Oats, small size	5.01	Grape Nuts	9.85
Brodies Oats	5.41	Quaker Farina	10.10
Quaker Oats, small size	5.57	Gusto	10.12
Roman Meal, large size	6.24	Roman Meal Nuggets	10.55
Malt Breakfast Food	6.43	Kellogg's Corn Flakes	10.64
Wheat Kernels	6.52	Hecker's Cream Farina	10.73
Kellogg's Bran	6.59	Shredded Wheat	10.75
Post Tavern Special	6.80	Kellogg's Wheat Biscuits	10.87
Pettijohns Breakfast Food	6.91	Wheatena	10.96
Quaker Corn Flakes	7.08	Good Health Breakfast Food	11.49
Cream of wheat	7.12	Uncle Sam's Health Food	12.94
Krinkle Corn Flakes	7.13	Kellogg's Wheat Flakes	13.18
Quaker Pearl Hominy	7.15	Force	13.63
Robin Hood Porridge Wheat	7.72	Quaker Puffed Wheat	20.14
Post Toasties	7.74	Quaker Puffed Rice	21.93
Kellogg's Corn Flakes, Dominion	8.29		

Another consequence of the varying amount of material in these packages is that where only one or two samples of the article have come into our hands, the results found cannot be held with certainty to describe the average character of the article.

Variations in weight and cost price of these foods are more noticeable than variations in the character of the food itself. Careful study of Tables I and II will bear out the conclusion that, so far as food value is concerned, the material is fairly constant in character. Thus to take a few examples, the following may be quoted:

Name of Food.	Number of samples.	Caloric value for 1000 grams. Dry.			Extreme Variation.
		Mean.	Maximum.	Minimum.	
Kellogg's Corn Flakes	17	4011	4064	3902	162
Cream of Wheat	16	4106	4125	3909	216
Force	18	4001	4026	3937	89
Grape Nuts	21	4000	4035	3971	64
Kellogg's Krumbles	13	3938	3967	3908	59
Post Toasties	18	3995	4123	3860	263
Quaker Puffed Wheat	16	4039	4118	3987	131
Shredded Wheat	14	4014	4029	3915	164

The calorie (large calorie) is that amount of energy which, when considered as heat, would suffice to raise the temperature of 1 litre of water through 1 degree Centigrade. It is not however important or necessary that the ordinary reader should bear this fact in mind. It is enough to regard the calorie as an arbitrary unit of measurement for energy (the power to perform work), just as the yard is an arbitrary unit of measurement for distance, or the pound for weight. The value of the term, for purposes such as the present, is entirely comparative. If a man needs 3,000 calories of energy per day, he must be furnished with food of such kind and in such quantity as will yield him 3,000 calories, if he is to maintain health.

Determination of the absolute calorific value of any form of food is carried out by actual combustion of a known weight of the food under circumstances which permit of the heat produced being accurately measured. The instrument used (Calorimeter) in these determinations is so constructed that the total available heat energy is produced. In other words, combustion is complete.

The digestion effected by the human organism is seldom, or never, so complete as this. Rubner has calculated that at least 8 per cent of our food, on a mixed diet, passes through the body undigested, or incompletely digested. (Hammersten's Physiological Chemistry, Translation by Mandel, p. 585). It follows that in calculating the energy available from a given diet, the calorific values as determined by the Calorimeter must be reduced by 8 per cent if we would know the actual human energy derivable from such diet.

For purposes like the present it is necessary to refer the various elements of food to a limited number of classes and to ascertain, for each class, a factor which shall, as closely as possible indicate the calorific value of unit weight of this class. It is convenient for this reason, to group together such food constituents as casein, albumen, gluten, myosin, legumin, etc., as proteids, and to use the same factor in calculating their calorific value. This can only be an approximation to actual fact, although a pretty close approximation; and quite sufficiently accurate to form a useful guide in ascertaining food values.

In the same way, all forms of fat are grouped, and an average factor employed in calculating their calorific values; while the various starches and sugars are classified together as Carbohydrates, and a common factor used.

Rubner, already quoted, used the following factors:—

For Proteids	4.1
" Fats	9 3
" Carbohydrates	4.1

These numbers were derived from experiments with dogs fed on meat, starch, sugar, etc.,; and more recent work has demonstrated that Rubner's factors do not allow for so much loss in digestion as has been found to occur with men living on an ordinary mixed diet.

Sherman (Chemistry of Food and Nutrition, p. 128) uses the factors 4, 9 and 4, for protein, fat and carbohydrates respectively; and it is quite probable that these factors more nearly represent the true energy values, when we regard human digestion. In this report I have however retained Rubner's factors, for the reason that they have been extensively used in work already published by this, and by other laboratories. Furthermore, they do not greatly differ from Sherman's factors; and anyone wishing to compare results by the latter may multiply the given calorie value by the factor 0·983 for proteids and carbohydrates; and 0·968 for fats.

In calculating carbohydrate values I have omitted "Crude Fibre." This term applies to matters insoluble in boiling sulphuric acid (1·25 per cent strength) or in boiling caustic soda (1·25 p.c.). However the facts of availability as food, for such material, may be in the case of the Ruminantia, it is inconceivable that crude fibre can possess any food value for man. The amount of crude fibre in most of these breakfast foods is so small that the inclusion of crude fibre with the digestible carbohydrates would be of trifling moment, but for the fact that a small number of these foods contain added fibre to such amount as would give them an undeservedly high apparent food value were it reckoned as starch or sugar, which are actually digestible.

Comparison of Brands as reported in Bulletin 330 (1915) and Bulletin 383 (1917):

	Number of samples.	Calories per gram as sold.	Cost (cents) per 1000 calories.
"Kellogg's Corn Flakes"			
Bulletin 330	4	3.612	.....
" 383	17	3.721	10.64
"Krinkle Corn Flakes"			
Bulletin 330	1	3.790	..
" 383	8	3.705	7.13
"Cream of Wheat"			
Bulletin 330	2	3 674	.....
" 383	16	3.694	7.12
"Force"			
Bulletin 330	1	3.675	.....
" 383	18	3.712	13.63
"Grape Nuts"			
Bulletin 330	3	3.711	.. ..
" 383	21	3.796	9.85
"Gusto"			
Bulletin 330	1	3.583	.....
" 383	6	3.693	10.12
"Heeker's Farina"			
Bulletin 330	1	3.716	.....
" 383	2	3.689	10.73
"Kellogg's Krumbles"			
Bulletin 330	1	3.634	.....
" 383	13	3.706	9.50

	Number of samples.	Calories per gram as sold.	Cost (cents) per 1000 calories.
"Kellogg's Wheat Biscuits"			
Bulletin 330	1	3.496	.....
" 383	4	3.638	10.87
"Malt Breakfast Food"			
Bulletin 330	1	3.669	.....
" 383	5	3.763	6.43
"Pettijohn's Breakfast Food"			
Bulletin 330	1	3.508	.....
" 383	7	3.643	6.91
"Post Toasties"			
Bulletin 330	1	3.700	.....
" 383	18	3.693	7.74
"Quaker Oats"			
Bulletin 330	1	3.816	.....
" 383	3	3.955	5.00
"Quaker Puffed Rice"			
Bulletin 330	1	3.683	.....
" 383	13	3.721	21.93
"Quaker Puffed Wheat"			
Bulletin 330	2	3.754	.....
" 383	16	3.715	20.14
"Robin Hood Porridge Oats"			
Bulletin 330	1	3.842	.....
" 383	4	3.955	5.01
"Roman Meal"			
Bulletin 330	4	3.490	.....
" 383	5	3.520	8.75
"Shredded Wheat"			
Bulletin 330	5	3.566	.....
" 383	14	3.685	10.75

In Table IV a comparison is made between the food value as determined in 1915 and this year in such brands of Breakfast Foods as came under examination in both inspections. That for 1915 is published as Bulletin No. 330. It is unfortunate that no determination of the weight of food in the packages were made in 1915, for which reason it is impossible to institute a comparison of the cost per calorie for the years named.

BULLETIN No. 384—MIDDLINGS (Shorts.)

OTTAWA, October 11, 1917.

SIR,—I have the honour to submit herewith a report upon 203 samples, purchased by our inspectors as Middlings or Shorts in April, May and June of this year.

Departmental regulations require this Feed to contain at least 15 per cent protein and 4 per cent fat; with not more than 8 per cent of crude fibre, and to be free from noxious weed-seeds. (Order in Council dated May 1st, 1911, published as Circular G, 968).

One hundred and seventy-eight (178) samples of this collection meet the above named requirements, the results of analysis being interpreted in accordance with section 15 of the Feeding Stuffs Act which provides that "a deficiency of one per cent of the protein or fat, or an excess of two per cent of fibre claimed to be contained in the feeding stuff, shall not be considered as evidence of fraudulent intent, if the total value of the feeding stuff in nutritive materials is substantially equivalent to the guaranteed statement made by the manufacturer or agent."

Eight (8) samples must be judged as adulterated under the Act, for the following reasons:

LOW PROTEIN AND FAT.

	Deficiency in protein.	Deficiency in fat.
No. 69784	0.44	0.58
" 7411	1.00	0.56
" 5613	1.50	0.03
" 52633	1.35	0.12
" 55981	1.23	0.80

LOW PROTEIN ONLY.

	Deficiency.
No. 77729	1.28
" 75744	1.89

LOW PROTEIN AND EXCESS FIBRE.

	Deficiency in protein.	Excess of fibre.
No. 77028	1.75	3.40

Ten (10) samples contain notable amounts of vital weed-seeds. This feature constitutes adulteration under G. 968.

It is, however, felt to be reasonable that a maximum limit, above which noxious weed-seeds shall constitute adulteration in feeds, should be legalized it is practically impossible, in certain classes of feeds, notably bran, chop and registered feeds, which may contain various forms of mill-offal, to prevent absolutely the entrance of these seeds. Moreover, while it may be very necessary to preclude the presence of weed-seeds in seed grain, it is not so absolutely necessary to do this with cattle feeds, since the digestive processes through which the seeds necessarily pass, result in destroying their vitality more or less.

This question has been considered in my report of May 20, 1913 (see Bulletin No. 254) and a recommendation to the effect that more than 25 seeds per pound of the feed, should constitute adulteration.

A much narrower limit than this might be justified for middlings (shorts) and feed flour, since these classes of feeds are necessarily ground to a high degree of fineness, and the presence of large numbers of vital seeds could only occur through carelessness in milling, or through intentional addition of material other than middlings or feed flour.

In Bulletin No. 350 I have discussed the advisability of recognizing a low grade flour, largely sold for feeding purposes, as distinct from shorts or middlings. It is mainly characterized by possessing a low fibre content and a higher starch content than ordinary middlings, and is usually whiter in colour. Although its nutritive value may be no greater, and is in some cases even less than that of middlings, it generally commands a higher price, probably because of its lighter colour, which is mistakenly held to indicate superiority. Five samples herein reported belong to the suggested class of feed flours; and four of them are low in proteid or fat value if judged as middlings. I have recommended that they be allowed to pass, as having been sold by mistake for another class of feed. No. 60680 is evidently a chop feed, and No.

71027 is linseed meal. In these cases I have recommended that the samples be permitted to pass as supplied in error.

Four other samples (55984, 55985, 75737 and 75743) are passed as very nearly meeting our standards.

BULLETIN No. 385—TABLE SALT.

OTTAWA, October 23, 1917.

SIR,—I beg to hand you a report upon 198 samples of Salt as refined for table use. The samples in question were obtained by our inspectors in April, May and June of this year.

This article has been examined and reported on three previous occasions under the Adulteration Act. The first report, published as Bulletin No. 128, in 1906 dealt with 87 samples, was written by my predecessor in office. It contains the following sentences:—

"The percentage of chloride of sodium contained in them varies from 93 to 98, with corresponding differences as regards the quantities of moisture and impurities present. It is probably inadmissible to call the latter adulterations, the limits of variability for salt not having been yet established in Canada. In the United States a standard was adopted on June 26, 1906 by circular No. 19 from the office of the Secretary of Agriculture, which reads as follows:—

"Table salt, dairy salt, is fine grained crystalline salt, containing on a water free basis, not more than one and four-tenths (1·4) per cent of calcium sulphate ($CaSO_4$), nor more than five-tenths (0·5) per cent of calcium and magnesium chlorides ($CaCl_2$) (and $MgCl_2$) nor more than one-tenth (0·1) per cent of matters insoluble in water."

It is not necessary to recalculate the results given in the table and state them on a dry basis in order to see that a very large proportion of the samples described would not come up to the United States standard. Taking the figures as they stand in the table there are at least one-half of the samples which would not do so. It is enough for the present to call attention to this fact in order that manufacturers or furnishers may aim at supplying an article of a higher degree of purity. On the other hand it is satisfactory to note that many of the samples of Canadian origin fulfil the requirements of the United States Department of Agriculture.

Among the samples examined there are six which contain foreign substances insoluble in water, and which have apparently been added to prevent the particles of salt from caking together. It does not appear that this constitutes adulteration, for the Act provides that the usual definitions shall not apply, "if any matter or ingredient not injurious to health has been added to the food or drug because the same is required for the production or preparation thereof as an article of commerce in a fit state for carriage or consumption, and not fraudulently to increase the bulk weight or measure of the food or drug, or to conceal the inferior quality thereof." Nevertheless it would seem to be necessary that these brands should each, on selling, be labelled as a mixture."

Subsequent examination of 273 samples (Bulletin No. 220, December, 1910) showed that 78 per cent of the collection met the above standard for Salt, as adopted by the Department of Agriculture, Washington; and a still later inspection of 139 samples in 1913 (Bulletin No. 270) justified the following remarks:—

"None of the samples can be regarded as in any way objectionable, still less as harmful, for the purposes of table salt.

At the same time, they vary in quality through a considerable range, as regards their freedom from other substances than chloride of sodium, which may be regarded as the essential and characteristic constituent of salt.

I think it not unreasonable to require that a purified salt, for table use, should be practically free from other chlorides than sodium chloride; and should contain sulphates in amount less than corresponding to 0·75 per cent of sulphuric acid (SO_3).

The only sulphate usually present in salt is calcium sulphate; and 0·75 per cent, SO_3 corresponds to about 1·28 per cent of calcium sulphate.

On this basis, 24 samples contain somewhat higher sulphates than should be found in refined salt.

Thirty samples show excessive amounts (above 0·1 per cent) of insoluble matter. In all cases this is of harmless character, and appears to be purposely added in order to reduce the hygroscopicity of the salt, and thus, to prevent caking. As I pointed out in Bulletin No. 220, the fact of such addition should be noted on the label."

The present report goes to show that table salt, as found in Canada, is a very satisfactory article. In the great majority of cases it is furnished without intentional additions, and those in cases in which from 1 to 2 per cent of non-hygroscopic matters (magnesium or calcium phosphate or carbonate) have been added to prevent caking the fact of such addition is usually announced on the label, or by the use of a distinctive brand name. Pure salt is, of course, chloride of sodium, and sodium chloride is actually present as follows:—

Above 99.5 per cent in	10	samples.
" 99.0 " "	84	"
" 98.5 " "	65	"
" 98.0 " "	25	"
Total	184	"
Below 98 per cent in	14	"
Total	198	"

With exception of two samples, those included in the class containing less than 98 per cent of sodium chloride are sold under distinctive names.

BULLETIN No. 386—CASCARA SAGRADA.

December 10, 1917.

SIR,—Owing to the fact that I have received many complaints, from physicians and others during recent years, regarding the preparations of cascara sagrada which are found in commerce, it has been considered desirable to make an examination of these, and particularly of the liquid extract, and the aromatic syrup. Both of these are pharmacopœal preparations, and if the official directions for their manufacture were conscientiously carried out they should exhibit at least an approximation to uniformity of character. The results of analysis herein presented will show that this is far from being the case; and there can be no doubt that many samples contain very little genuine extractive of cascara.

Several samples have been sold under names which are not recognized by any pharmacopeia. Where such samples bear a registration number, they conform to the requirements of the Proprietary or Patent Medicines Act. Otherwise they are sold in contravention of this Act.

The analytical work has been done, as is usual, in this laboratory and in the sub-laboratories at Halifax, Winnipeg, and Vancouver. Owing to the special nature of the subject, investigatory work was entrusted to Mr. Westman and Mr. Rowat, and their report being necessarily of a highly technical character, it is impossible to present it otherwise than in extenso and to do justice to the great amount of labour which they have bestowed upon the problem. For this reason I submit their report in detail; and I believe that it will be read with interest by physicians and by manufacturers as well as by analytical chemists, and by the public.

The data furnished by it will, it is hoped, make possible such specifications and standards for preparations of cascara sagrada, as shall enable us to check these, and control them in the interest of the medical profession and the public.

In all, 162 samples have been analyzed as follows:—

At Ottawa	76	samples.
" Halifax	28	"
" Winnipeg	32	"
" Vancouver	26	"
Total	162	"

This laboratory is specially indebted to Dr. J. M. Francis, Chief Chemist of the Parke, Davis Company, Detroit, for assistance in this investigation.

I beg to recommend publication of this report as Bulletin No. 386.

December 6, 1917.

Dr. A. McGill,
Chief Analyst,
Ottawa, Ont.

Dear Sir,—We beg herewith to submit a report to you dealing with the analysis of seventy-six samples collected as liquid extract of cascara sagrada. We have included such data in our tables as was available from the work of other laboratories. As our report is the result of more exhaustive work than was undertaken at the branch laboratories and covers a much larger number of samples, it is found that the inclusion of this data in our tables does not greatly change our averages.

As this was the first time that a collection of this nature had been examined by these laboratories, it was found necessary not only to appeal very largely to original articles dealing with the subject, but to carry on certain investigatory work of a somewhat original nature in order to devise a means of evaluating such extracts, either relatively, or absolutely, from the viewpoint of chemical analysis.

Before approaching work of this kind a knowledge of the requirements of various pharmacopœias is essential as a constant guide. This information has been collected and is outlined below.

PREPARATION AS DEFINED IN B. P. 1914 AND CODEX 1911.

Cascara sagrada is defined to be "The dried bark of Rhamnus purshiana D.C. and collected at least one year before being used."

The official preparations as defined in this edition, as far as liquids or fluids are concerned, are,

1. *Liquid Extract of Cascara Sagrada.*

Cascara Sagrada in No. 20 powder	1,000 grammes.
Alcohol (90%)	250 cc.
Distilled water sufficient to produce	1,000 cc.

Instructions are given to exhaust the cascara sagrada with the distilled water by the percolation process. This process is given in B. P. Appendix, 1914, p. 526, as follows: "Moisten the solid materials with the prescribed quantity of menstrum, set aside for four hours, in a well-closed vessel, pack in a percolator, add sufficient of the menstrum to saturate the materials and leave a layer of liquid above. Macerate for 24 hours; then allow percolation to proceed slowly until the percolate measures about three-fourths of the volume required for the finished tincture. Press the marc, mix the expressed liquid with the percolate and add sufficient of the menstrum to produce the required volume. Clarify by subsidence or filtration, if necessary."

Following this the percolate is evaporated to 600cc and the alcohol, previously mixed with sufficient distilled water to produce the required volume is added. Methods of percolation are quoted in detail for the reason that they differ and this difference might be the basis of slight variations in genuine liquid extracts.

2. *Aromatic syrup of cascara. B.P. 1914, p. 377.*

Although the original intention was not to examine extracts of this nature, a considerable number were collected by our inspectors and since they form a large percentage of cascara preparations it seemed best to make some examination of their value. A large number of samples were sold simply as "Cascara Sagrada." Some of these were liquid extracts and some were aromatic. Being sold as above under a name that is not descriptive or definite in any sense it is to be implied that they do not claim to conform with any pharmacopœial standards. Analysis in many cases shows the correctness of this implication. It is to be noted at the same time that they are not sold as registered patent medicines.

The aromatic syrup of cascara B.P. contains:—

Liquid Extract of Cascara Sagrada	400 cc.
Tincture of orange	100 cc.
Alcohol (90%)	50 cc.
Cinnamon water	150 cc.
Syrup sufficient to produce	1,000 cc.

The syrup referred to is stipulated to be made from refined sugar and water. 1,000 grammes of sugar made up to a weight of 1,500 grammes. This gives a specific gravity of 1·330.

The B. P. Codex, 1911, mentions seventeen extracts and compounds in which cascara may be employed. Four of these are compound tablets or pills. The rest are liquid, fluid, or aromatic extracts or mixtures. They may contain in general any combination of aromatic oils, tinctures, licorice, glycerin, alcohol, alkalis, ammonia or chloroform water.

In order to destroy the natural bitter taste of the cascara, lime, magnesia, potassium hydroxide, ammonia and zinc oxide have been used with some success during percolation. Penschuck Chem. Abst, 1915, states, that for the purpose of debittering, sodium and ammonium salts are better than calcium or magnesium on account of the solubility of the products formed. Chloroform water may be added to prevent active fermentation. The use of alkalis follows from the incompatibility of extracts of cascara with acids or strong solutions of mineral salts.

PREPARATION OF CASCARA SAGRADA DEFINED IN U. S. P.

Cascara sagrada is defined as "The dried bark of the trunk and branches of *Rhamnus purshiana* De Candolle (fam. Rhamnaceae)."

Four official preparations are mentioned. These are, extract, the powdered extract, the fluid extract, and the aromatic fluid extract. The last two alone will be described here.

1. Fluid extract of cascara sagrada U. S. P., 1910:—

Cascara Sagrada in No. 40 powder	1,000 grammes.
Alcohol	250 cc.

It is stated that the percolation should be carried out in the following manner. Type process D., p. 176, U. S. P., 1910. "To 1,000 grammes of the ground drug add 5,000cc. of boiling water, mix thoroughly, allow it to macerate in a covered container in a warm place for two hours. Then transfer the moist drug to a tinned or enamelled percolator, and allow percolation to proceed, gradually adding boiling water until the drug is exhausted. Evaporate the percolate on a water bath to the volume specified and when cold add the alcohol directed and mix thoroughly." From 1,000 grammes of drug 1,000cc. of fluid extract are made by the method quoted.

2. Aromatic Fluid extract of cascara (official), U.S.P., 1910, p. 180, contains the following:—

Cascara Sagrada No. 40 powder	1,000 grammes.
Magnesium oxide	125 "
Pure Extract of Glycyrrhiza (licorice)	40 "
Glycerin	200 ccs.
Alcohol	250 "
Benzosulphimide	1 gramme.
Oil of cinnamon	0·2 ccs.
Oil of anise	2·5 "
Oil of coriander	0·1 "
Methyl salicylate	0·2 "
Boiling water sufficient to produce	1,000 "

The cascara sagrada is thoroughly mixed with the magnesium oxide and moistened with 2,000cc. of boiling water. It is allowed to stand for two hours with stirring and then placed in a percolator. Boiling water is poured on the drug until exhausted and the percolate evaporated to 500cc. and while yet warm, the licorice is dissolved in it. When cold the glycerin is added and then the alcohol in which the benzosulphimide and oils have been dissolved. Finally sufficient water to make the required volume of 1,000cc. is added.

The French Pharmacopœia adds nothing new to the above and the literature bearing on the analytical constants to be expected from the analysis of such mixtures is very scanty, and covers at most the examination of a very few samples, none of which were either prepared or sold in this country.

Cascara sagrada (sacred bark) is the bark of a Western American tree, *Rhamnus purshiana*. It was discovered in 1806. In 1877 it was raised from the status of an Indian preparation to one used by the medical profession by Dr. J. H. Bundy. It was in 1878 that the Parke Davis Company, Detroit, Mich., first placed a fluid extract on the market. The next year it was introduced into Europe by the British Medical Association. In 1911 it was estimated that one million pounds of this bark were being used annually. Up to the present no cultivation of the tree has been carried beyond the experimental stage. Any increase in the price has been sufficient inducement for the more extensive gathering of the natural bark.

It is impossible to review here all the work that has been done on the botanical and chemical nature of this bark and the group to which it belongs. Only a few general and indispensable points will be considered and a few of the better references

given. The complexity of the chemistry involved in a study of the active constituents and bitter principles of such drugs has been so great that their actual identification has not yet been established. Prescott, Amer. Jour. of Pharm., vol. 51, 1879, p. 165, working on the bark isolated, certain resins, tannic acid, oxalic and malic acid, certain oils, and wax. The presence of emodin in this bark is noted by Limousin Jour. de Pharm. et de Chim., vol. 6, 1885, p. 80, and Jowett, Proc. Amer. Pharm. Assoc., vol. 52, 1904, p. 288, isolated certain isomers of emodin as well as arachidic acid and a hydrolytic enzyme. Mossler. Pharm. Post, 1913, vol. 46, p. 313, dealing with emodin-bearing drugs, rhubarb, cascara, senna and aloes obtains crystals, after suitable extraction, which are seen to be specific for the first three under polarized light. The chemistry of cascara is inseparable from that of other drugs of the same class, namely, the emodin-bearing drugs aloes, rhubarb, and senna. As these are at any time likely, from their properties to be in admixture the analyst must as far as he is able apply qualitative tests for their distinction when dealing with any one of them unless he knows absolutely the previous history of the sample. Besides those mentioned we have *Rhamnus frangula* (buckthorn) which is more like *Rhamnus purshiana* (cascara) than any of the others..

This class of drugs may be best tested for by the Bornträger reaction for emodin. The nature of this test and other colour tests will be given later. Neither the bitter nor the total laxative properties of these drugs are due to this constituent. Emodin is a trioxymethylanthraquinone. It is a hydrolytic decomposition product of glucosides in the bark. Although the active constituents of these drugs are not known, it may be said that they are not alkaloids.

The genuine *Rhamnus purshiana* is most likely to be confused with the members of the same family, *Rhamnus frangula* and *Rhamnus californica*. *Rhamnus frangula* is imported into this country from Europe. *Rhamnus californica* grows in greater abundance in the southwestern States than it does in the north. There are sufficient points of difference to render their identification fairly easy under the microscope or by colour test and extracts. No legitimate excuse could thus be made for their indiscriminate use. Other barks have been found present in shipments or *Rhamnus purshiana*. Among them are to be mentioned Western Wild Cherry, and *Cornus nutelli* (Western Flowering Dogwood). A large volume of work has accumulated with reference to the barks themselves and their microscopy. The best bibliography of this work up to 1914 is given by Johnson and Hindman, Amer. Jour. Pharm., 1914, p. 387. Here a history of the drug and 139 articles of reference on *Rhamnus purshiana* may be found.

Considerable work has been done from the viewpoint of the analyst who is called upon to distinguish cascara in admixture. Emodin may be detected in the presence of phenolphthalein, as is shown by Warren, Amer. Jour. Pharm., Oct., 1914, p. 444. Tichborne, British Year Book of Pharm., 1901, p. 439, gives an account of his examination of 29 samples of liquid extract of cascara; 9 were adulterated. This opinion was based on the drying or non-drying qualities of the extract and the amount of reducing sugars present.

ANALYTICAL DETERMINATIONS AND NATURE OF WORK REPORTED.

After due consideration of the possible data which might be derived from work on these samples, it was decided that the basis of our report should be made to include the following determinations. The headings which are to follow will be discussed one by one and reasons set forth for their adoption. Wherever possible analytical results will be discussed from the viewpoint of standards. Tables showing ranges and averages will be given along with the method of procedure in outline.

1. SPECIFIC GRAVITY.

By this determination alone a close line may be drawn between those samples which are likely to prove to be aromatic and those likely to be found liquid or fluid extracts of cascara. Determinations were made directly at room temperature (20 deg. C.) by means of a set of hydrometers. The following table deals with 130 samples and bears no relation to what these samples were sold as, but is based on what their examination proved them to be. Three tables forming a natural division of the whole number are given:—

TABLE 1.

1. Aromatic Extracts of Cascara.		2. Preparations not "official" sold under various labels. Some sold as Fluid Ex. Cas. Sag.		3. Fluid Extract of Cascara.	
Range of sp. gr.	Samples in range.	Range of sp. gr.	Samples in range.	Range of sp. gr.	Samples in range.
1.00 to 1.10	None.	1.00 to 1.10	5	1.00 to 1.03	0
		1.10 to 1.15	0	1.03 to 1.04	1
1.10 to 1.15	3	1.15 to 1.20	11	1.04 to 1.05	3
1.15 to 1.20	8	1.20 to 1.25	2	1.05 to 1.06	12
1.20 to 1.25	3	1.25 to 1.30	0	1.06 to 1.07	29
1.25 to 1.30	4	1.30 to 1.35	0	1.07 to 1.08	40
		1.35 to 1.40	1	1.08 to 1.09	4
	Total 18		Total 19	1.09 to 1.10	4
					Total 93

Group one contains licorice, glycerin and aromatics.

Group two contains trade preparations, glycerinated cascaras without licorice or aromatics.

Group three contains preparations presumed to be Fluid Extracts of Cascara.

It is to be noted here that Squire's Companion to B.P. p. 410, 1916 gives the specific gravity of Liquid Extracts as 1·060. It would appear from our work that a suitable range would be from 1·05 to 1·08. Samples below this range proved to be diluted extracts by other determinations, and samples above this range contain more solids than it is normally possible to extract by official methods of percolation.

2. ALCOHOL.

It has been calculated that B.P. Fluid Etracts of Cascara Sagrada should contain 25·5 per cent ethyl alcohol by volume. This is based on the ground that the 250cc. of 90 per cent alcohol required is equivalent to 225cc. of absolute alcohol.

By similar methods, and by reference to requirements it may be shown that:—

B.P. Syr. Cas. Sag. should contain 13·5% alcohol by volume.
U.S.P. Fl. Cas. Sag. should contain 24% alcohol by volume.
U.S.P. Aromatic Cas. Sag. should contain 24% alcohol by volume.

From an inspection of the above and from consideration of tables it may be seen to what extent these conditions have been met with by samples under consideration. These tables refer to the same classification as was given under previous heading.

TABLE 2.

Group 1.		Group 3.	
Range of alcohol.	Samples.	Range of alcohol.	Samples.
0 to 1%	4	3 to 4%	1
1 " 2	5	10 " 11	1
2 " 3	2	13 " 14	1
3 " 4	1	14 " 15	5
4 " 5	0	15 " 16	2
5 " 6	1	16 " 17	16
6 " 9	0	17 " 18	14
9 " 10	1	18 " 19	2
10 " 14	0	19 " 20	13
14 " 15	2	20 " 21	11
15 " 16	1	21 " 22	5
16 " 19	0	22 " 23	8
19 " 20	1	23 " 24	9
	Total 18	24 " 25	1
Group 2.		25 " 26	1
0 to 1%	3	26 " 27	1
1 " 2	8	27 " 28	1
2 " 11	0	28 " 29	2
11 " 12	2	29 " 30	1
12 " 13	0	30 " 31	1
13 " 14	2		Total 96
14 " 17	0		
17 " 18	1		
18 " 21	0		
21 " 22	2		
	Total 18		

Very few samples comply strictly with the alcohol requirements. The presence of the required amounts of both alcohol and glycerin in Aromatic samples is very rare and the majority of fluid extracts range a few per cent low. The extracts of lower alcoholic strength give an increased sedimentation on standing. Glycerin when present in sufficient quantity gives a permanent solution of solids which would otherwise settle out on dilution with water.

3. TOTAL SOLIDS.

TABLE 3.

Group 1. Total Solids.	Samples.	Group 2. Total Solids.	Samples.	Group 3. Total Solids.	Samples.
40 to 50%	5	15 to 20%	1	Below 18%	6
50 " 60	4	20 " 25	3	18 to 20	2
60 " 70	3	25 " 35	1	20 " 25	27
70 " 80	4	35 " 45	0	25 " 30	45
80 " 90	2	45 " 50	2	30 " 35	16
		50 " 60	2		
		60 " 70	8		
		70 " 95	2		
	Total 18		Total 19		Total 96

Here a marked difference is shown between the aromatic and near aromatic, and the liquid extracts. This is due to the presence of licorice, glycerine or sugar. Perhaps the total solids show better than any other single determination the inconstancy of the composition of aromatic extracts and trade preparations. Squire's would allow

a range of from 17 to 27 per cent solids W/V. This is a very wide range yet it does not seem wide enough to contain all the samples sold as Liquid Extracts. Parke, Davis and Co. in a private communication supplied us with data relative to the possibility of obtaining a uniform extract from cascara bark. Out of 24 lots of this drug, working on a commercial basis, the extractive matter never once fell below 18·8 per cent and exceeded 22 per cent in only one instance. This particular sample ran up to 26·6 per cent. They were using the official U.S.P. method of percolation. From such evidence it would appear that there is no valid reason why the total solids of a genuine extract of cascara made according to any official preparation should not remain uniform, from time to time. It seems quite evident then that the range for extracts sold as official liquid or fluid extracts might reasonably be established temporarily as ranging from 17 to 27 per cent. It may be seen from the general table or from group 3 of this section that a large number sold at present would be cut out under such a ruling.

The problem of setting standards for total solids is made more complicated when it is considered that even while using official methods of percolation results obtained may differ. Our own work shows this. By the method of extraction employed by the B.P. we obtained on two samples of genuine cascara bark an extract whose total solid content ran 21·79 and 21·03 per cent. While working on this same bark and using the U.S.P. method of percolation we obtained 30·50 and 31·48 per cent solids. In order to wash out the last traces of colour we used 1800cc. of water in portions of 75cc. (boiling). The official U.S.P. method requires the washing to be sufficient to give a clear filtrate coming through. It does not specify the amount or the portions in which this amount is to be used. We were working on 50 gram samples of No. 40 powdered bark. These factors that are not mentioned are important in obtaining uniform results. It must then be admitted that such methods as are given in pharmacopoeias are of little value as they now stand as a basis for standards. Much greater detail is necessary before uniformity should be looked for in the products of different firms. Such results as quoted above from Parke, Davis & Co., simply go to show that they work in a uniform manner. Others using different detail might easily obtain uniform results several per cent higher, and yet would be using the official method.

The exposure of a few drops of cascara extract on a porcelain plate serves as a very simple and useful test of the nature of any cascara extract. A genuine liquid extract will dry up in a short time to a hard varnish. If the extract contains licorice or glycerin it will not dry even after long exposure over days or weeks. A diluted extract of cascara will not readily dry out to a hard glassy varnish. It forms a sticky semi-crystalline mass, which does not lose this property for several days. This may be due to the fact that on dilution the resins will precipitate out first, and if they are already partly gone the remaining solution is unable to form the same natural varnish that the genuine extract does. There would also seem to be a definite relation between this drying property and the reducing sugar content. A normal liquid extract of cascara contains not less than 5·75 per cent of reducing sugars calculated as glucose. If the sugar content is above this limit it will quickly dry to a glassy varnish. If the reducing sugar content is below this it will not quickly dry but remains a sticky mass on the plate. All aromatic extracts studied were found to be non-drying due to their glycerin content.

The total solids were determined as W/V. 10cc. were dried in platinum at 110 deg. C., to a constant weight. Those samples containing glycerin make results of this nature hard to control to very narrow limits, for the reason that at this temperature there is some loss of the glycerin in the steam.

4. SOLIDS PRECIPITATED ON DILUTION.

An aromatic extract containing glycerin or licorice will keep in solution all its solids on dilution with water. On the other hand a liquid extract whose solids are

retained in solution by virtue of its alcohol content will when diluted give a measurable precipitation. If the solution has the proper content of alcohol, but is lacking in cascara bark extractive, this deficiency is made evident by the small precipitation on dilution. It may be noted here that concentrated extract of cascara is insoluble to a large measure in 90 per cent alcohol. As this alcohol is diluted these solids go into solution but on excessive dilution where the alcohol content drops to 10 per cent or lower a marked settling out of the solids occurs. The dilution was made by dropping 5cc. of the extract into 95cc. of water and filtering off the solids formed.

TABLE 4.

Group 1.—No precipitation on dilution observed in any sample.

Group 2.—No precipitation on dilution observed in 12 samples. Two samples showed some precipitation up to 2 per cent.

Group 3.—No precipitation on dilution observed in one sample only.

This sample contained only 3 per cent alcohol and no precipitation was to be expected.

Percentage W/V of Solids precipitated on dilution.	Samples.
0·50 to 1·0 per cent	5
1·00 " 1·50 "	11
1·50 " 2·00 "	13
2·00 " 2·50 "	12
2·50 " 3·00 "	5
3·00 " 3·50 "	4
3·50 " 4·50 "	2
Total	52

It is evident here that the extreme limits for apparently genuine extracts would be from 1·00 per cent to 4·50 per cent. It might be more advisable to place a lower limit on at 1·5 per cent.

5. REDUCING SUGARS.

Reducing sugars, as glucose, were estimated on 76 samples. There is a variation shown and it is evident that there is a normal content for genuine liquid extracts of cascara. This runs from 5·25 to 7·75 per cent. Aromatic extracts are always much lower and run from 1 to 3 per cent. The amount of sugar formed in a normal liquid extract by acid hydrolysis does not exceed 3 per cent. If more than this amount is present it is evidence of added sucrose.

TABLE 5.

Group 1.		Group 2.		Group 3.	
Reducing Sugar.	Samples.	Reducing Sugar.	Samples.	Reducing Sugar.	Samples.
0 to 1%	1	0 to 1%	0	0 to 4%	2
1 " 2	3	1 " 2	2	4 " 5	7
2 " 3	3	2 " 3	2	5 " 6	6
3 " 4	1	3 " 4	3	6 " 7	17
	Total 8	4 " 5	1	7 " 8	10
Less than 5%	8	5 " 6	0	8 " 9	7
Greater than 5%	0	6 " 7	2	9 " 10	1
		7 " 8	1	10 " 11	4
		8 " 9	2		Total 54
		9 " 10	2		
			Total 15		
		Less than 5%	8	Less than 5%	9
		Greater than 5%	7	Greater than 5%	45

These groups are the same as are referred to on page 8 and it will be seen that those samples running above 7·5 per cent reducing sugars in group 3 are all samples with abnormally high solids.

6. LICORICE, GLYCERIN, AROMATICS.

These substances are used to disguise the bitter taste of the cascara. No quantitative work was done except in the case of glycerin. The exact determination of glycerin in such admixture presents considerable difficulty. An approximation was arrived at by the method of boiling off in steam; 10 cc. of the aromatic extract was slowly heated to 160° C., and by the addition of small quantities of water from time to time the glycerin was boiled off. The glycerin was estimated to be the difference between the solids remaining at this temperature and those remaining after one drying at 110° C.

A certain increase in weight occurs due to the slow oxidation at this temperature. It is also very likely that some glycerin becomes non-volatile during the process. The sum-total of these errors, however, as determined through such suitable blanks as could be devised, is not great enough to destroy the usefulness of the method. The chief error arises from oxidation of the solids during the process. This may amount to a 2 per cent increase W/V of the total solids present, after eight hours at 160° C. A mixture of pure glycerin and a genuine cascara showed that practically all the glycerin could be driven off in this way.

It may be calculated that there should be about 25 per cent glycerin present W/V in a U.S.P. aromatic extract. Out of seventeen samples, examined twelve of which belonged to group 2, eight were found to be below 25 per cent.

No attempt was made to identify any of the aromatic substances used. They are present in very small quantities and are quite harmless.

7. ASH.

The value of an ash determination becomes evident from a consideration of its variation. If some attempt has been made to debitter the extract by application of lime, soda, ammonium salts, or magnesia, it is possible, that through contamination or solution these may greatly increase the ash in amount. Such was found to be the case. The colour of the ash, when heated strongly in a muffle is also a good indication of the nature of the sample. The ash from an aromatic extract containing glycerin and licorice will be greyish white. The ash from samples containing excess of lime salts will be pure white. The ash of genuine samples will be some shade of green depending on the amount of manganite salts present. This manganese comes from the bark and is sufficiently soluble in the water extract to be found in this way in the ash. The calcium in the ash is not a constituent which might come from percolation of the bark and the solution of calcium salts. These salts are not removed to any extent by boiling the bark in water, and are evidently present in the bark as oxalate and carbonate. A table of the ash values follows. It will be seen that in classes 1 and 2, which are aromatic and nondescript samples, the range is very wide. In group 3, however, where the liquid and fluid extracts are tabulated, the range is seen to be within more reasonable limits.

The ash varies as the solids extracted. For a sample extracted by B.P. method giving 21 per cent solids the ash was 0·96 per cent, and for sample extracted by U.S.P. method giving 30 per cent solids the ash was 1·08 per cent. In both cases the ash was a beautiful green colour.

Tables dealing with the ash of seventy-seven samples:—

TABLE 6.

Group 1.		Group 2.		Group 3.	
1 to 1·5%	1	Below 1 %	1	0·0 to 0·5%	1
1·5 " 2·0	1	1 to 1·5	0	0·5 " 1·0	33
2·0 " 2·5	1	1·5 " 2·0	1	1·0 " 1·5	18
2·5 " 3·5	0	2· " 2·5	2	1·5 " 2·0	5
3·5 " 4·0	4	2·5 " 3·0	0	2·0 " 2 5	1
4·0 " 5·0	0	3· " 3·5	1	3·0 " 4·0	1
5·0 " 5·5	1	3·5 " 4·0	4		
		4·0 " 4·5	1		
Total	8	Total	10	Total	59

It would seem from our experience that a range of from 0·7 to 1·1 per cent for the ash of genuine liquid extracts of cascara would not be unjust. Any extracts either above or below these limits were found to be abnormal in some respect.

8. MANGANESE NUMBER.

An attempt is here made to take advantage of the fact that the bark of *Rhamnus purshiana* contains a relatively large quantity of manganese which is soluble by the method of percolation. As stated above, the manganese gives a green colour to the ash. The general usefulness of this determination depends on the fact that the manganese content of this bark is greatly in excess of that of any other laxative drug, except *Rhamnus frangula*. This drug is one that is imported and its cost is such that it is not likely to become an adulterant of *Rhamnus purshiana*. In the majority of liquid extracts, then, where cascara is the only drug extractive present a determination of the manganese content of the ash becomes a semi-quantitative measure of the actual amount of cascara extractive present. Before trusting to such data it is necessary to show that the manganese content of cascara is fairly uniform or at least define its limits. To this end various samples of this bark were obtained and in particular guaranteed samples were kindly supplied by Parke Davis & Company. The percentage of manganese in the bark depends on its thickness. In general the inside shows a much higher content than the outside and the thinner bark shows a higher percentage than the thicker. From an examination of selected bark it was determined that on an air-dry basis the lower limit for thick bark is around 0·0093 per cent Mn. and the upper limit 0·015 p.c. Mn. No doubt selected bark might run below and above these limits. For the purpose of this work where the manganese is used as a standard the lower limit is the more important, and it is safe to say that the most or greater part of the bark coming on the market easily reaches this standard. For our purposes it was necessary to show that the methods of percolation extracted this manganese in a uniform manner. It was found that for a definite method of percolation, the manganese was extracted in proportion to its total amount in the bark. Thus it was found that a bark whose original manganese content was 0·099 per cent gave in its extract 0·0023 p.c. Mn. when the B.P. method of percolation was used. This same bark when extracted by the U.S.P. method gave as previously stated 30 per cent solids and 0·0028 p.c. Mn. The manganese is extracted proportionally to the solids and about one-quarter of the total manganese is available in the extract from cascara bark. These are lower limits as more than these amounts were found in many samples. These may be taken as the minimum amounts that should be present provided genuine

cascara bark has been used and no dilution of the extract has taken place. For a liquid extract one cc. is the equivalent of one gram of the bark. Thus, providing the method of extraction is known, the percentage of manganese W/V of the extract is in direct proportion to the percentage extracted. Since the percentage extracted is uniform for a given method, this number should be a direct measure of the bark equivalent of the extract. Thus we have developed what may be defined as a MANGANESE NUMBER. This is the per cent W/V of manganese × 100,000. It is necessary for us to place our lower limit at 0·0023 per cent, as all official methods may not give the same result if the detail varies. The amount of manganese extracted from cascara bark should be approximately proportional to the solids extracted. That is the per cent of manganese in the total solids of a genuine extract should be approximately constant, provided the method of extraction is uniform. Considering all our results where extraction may not have been uniform, this number ranges from 0·01 to 0·025 for samples deemed genuine. If this number falls below this, it is evident that the solids of this extract are not all cascara solids. This test is of value in distinguishing extracts of *Rhamnus californica* and *Rhamnus purshiana*. Only one sample of *Rhamnus californica* was available. This was mature bark of the same order of thickness as the cascara giving us our lower limits. Its total manganese content was 0·0027 per cent. This gives a correspondingly low extractive of 0·0008 per cent. It is thus apparent that an extract from this bark would have a much lower manganese number than an extract from *Rhamnus purshiana*. Whether or not some of the extracts examined which show low manganese numbers have been prepared from this bark is a matter of inference. Examination of *Rhamnus frangula* proved that the bark contained on the average about three times as much manganese as *Rhamnus purshiana* and extracted about four times as much by the same procedure. For mature bark 0·0248 per cent Mn. was found present. For one sample of thinner bark 0·0626 per cent Mn. was determined. This in itself is quite remarkable as it is by far the highest per cent of manganese so far determined in any organic substances of this nature from data available. All these calculations are made on air-dry samples whose moisture content ran from 7 to 7·5 per cent.

Before coming to the application of this determination, and its value in a study of aromatic extracts, it is necessary to discuss the manganese content of licorice root, and the more common laxative drugs such as senna, rhubarb, aloes and wahoo bark. Work was done on these similar to that above. The total manganese content of senna leaves was 0·0040 per cent, rhubarb 0·0034 per cent, licorice root 0·0025 per cent, wahoo bark 0·0020 per cent, and barbadoes aloes 0·0006 per cent. The licorice and the senna are the only two that will be mentioned. Licorice occurs in nearly all aromatic preparations and senna is often sold in admixture with cascara. Water extracts of these showed very small amounts of manganese to be extracted. It is thus seen that when these drugs displace cascara the manganese content will be very much lowered. On the other hand if they are present in addition to the cascara extract the total manganese content would only be slightly raised by their presence and the percentage of total manganese based on total solids would be much below that of a genuine extract. Thus even while considering aromatic extracts it is safe to say that their manganese content varies directly with their cascara content.

It was found best to work on 10cc. of the extract, or on 10 grammes of the bark. The ammonium persulphate method with silver salt as catalyser was used. The sample was completely ashed and taken up directly with about 15cc. of concentrated sulphuric acid in platinum. This was heated till the acid fumed freely. This was then washed either into a beaker or a volumetric flask.

If the ashing has not been complete this solution may be filtered on dilution and again ashed. For small amounts up to 0·004 per cent manganese good work may be accomplished by using a volumetric flask of 100cc. capacity. The colour obtained on this dilution may be compared with that of standard permanganate solution made up

as nearly as possible like the solution to be tested with special regard for duplicate acid concentrations. For percentages higher than this, and using a 10 gramme sample the colour will be so deep that a larger volume of solution must be used. Unless the solution is sufficiently dilute a hydrated form of manganese will precipitate out. For a 10 gramme sample running 0·02 per cent manganese a dilution of at least 400cc. is necessary in order to avoid the formation of the hydrated form on the addition of the ammonium persulphate. One cc. of silver nitrate solution made from 5 grammes of this salt per 100cc. was added as a catalyser. The solution was then warmed to about 80° C., and a gramme of ammonium persulphate was added. The solution was then allowed to stand on a steam bath. The colour did not always come at the same rate but it was certainly complete at the end of one hour. It was then cooled and titrated with standard sodium arsenite solution or if sample contained low percentages of manganese it was compared colorometrically. We were able to check results working both ways or either way.

A table follows in which the manganese numbers are given as defined above. Seventy-six samples were tested in this manner.

TABLE 7.

Group 1.		Group 2.		Group 3.	
Range of Manganese.	Samples.	Range of Manganese.	Samples.	Range of Manganese.	Samples.
0 to 50	3	0 to 50	5	0 to 100	0
50 " 100	1	50 " 100	1	100 " 150	6
100 " 150	1	100 " 150	0	150 " 200	6
150 " 200	2	150 " 200	3	200 " 250	7
200 " 400	0	200 " 250	2	250 " 300	10
400 " 450	1	250 " 400	0	300 " 350	6
		400 " 450	1	350 " 400	3
		450 " 600	2	400 " 500	13
		600 " 700	1	500 " 600	1
				600 " 700	1
	Total 8		Total 15		Total 53

From this it will be seen that a large number of aromatic extracts and trade preparations are exceedingly low in cascara extract. It may be doubted if some of them contain even more than a trace. The fluid extracts appear at their true advantage under this test. It is to be noted that an aromatic extract properly prepared does reveal its cascara content by this test. The higher numbers in groups one and two show this.

9. COLOUR REACTIONS AND TESTS.

The Bornträger reaction is most general for emodin-bearing drugs. If the aqueous extract is acidulated and extracted with benzol and the extract washed with water a red colouration will appear in the aqueous layer when this is made alkaline. This test holds good in the presence of emodin or other anthraquinone compounds. Cascara will respond to the test in greater dilution than any of the other drugs that come in this class. Senna fails to always respond to this test in a satisfactory manner and no conclusive evidence of its presence is to be gained in this way. Its presence, however, does not destroy the test when the slightest trace of cascara is present. Phenolphthalein of course will mask these tests. It may be removed by the method of Warren Amer. J. Pharm. 86, 1914, p. 444. This procedure could not be applied

to so many samples where its presence was not even suspected. There is a difference in the colour given by cascara alone, and phenolphthalein alone, that may be distinguished. The cascara is a deeper red and is more the colour of methyl orange. Even in admixture there is a difference in the colour which is quite distinct from that given by either of the substances alone. Moreover the phenolphtalein colour fades when the solution is made strongly alkaline and allowed to stand. In this way all samples were tested and compared with standards and in no case was any evidence of the presence of phenolphthalein observed. It was found impossible to detect other emodin-bearing drugs in the presence of such large quantities of cascara. All colour reactions where alkaline salts are used as a basis and where the formation of rings of different shades is depended upon were found untrustworthy. In every case the cascara masked such faint differences as are to be noted when comparing genuine individual extracts. A pure extract of rhubarb will give on ether extraction a blue colouration when brought in contact with solution of ferrous sulphate. When one tries to follow this reaction in the presence of 50 per cent cascara extract the difficulty is greatly increased because although cascara does not give the same shade of blue it does give a colouration which may be sufficiently dense to make the detection of rhubarb almost impossible. It is thus quite evident that small percentages of emodin-bearing drugs are much more likely to be missed than they are to be positively identified when present in small and unknown admixture with cascara. Hubbard reviews (Jour. Ind. and Eng. Chem., 1917, p. 518) the generally known colour reactions for these drugs. He concludes that senna is the most difficult to detect. In the presence of ammonium thiocyanate the ether extract of senna is said to give a yellow to brownish colour, also with ammonium molybdate. We were unable to obtain these colourations and in each case observed no colour change. A good method for the detection of senna would be of great assistance in the examination of cascara mixtures as this drug is the one most likely to be found in admixture in many trade preparations of cascara. The absolute detection of aloes has been probably better worked out than any of the others. Mossler, Pharm. Post. 46, 1917, p. 313, claims the ability to detect 0·2 g. of aloes in 5 grammes of rhubarb or cascara. The fluorescence test for aloes in the presence of cascara, using borax solution with the ether extract, is certainly not delicate enough to be of much value when the cascara is in any great excess. In general it may be said, that the extracts of these drugs give a red colouration in solutions where the hydroxyl ion is present in excess. In the Bornträger reaction ammonia is used directly. Borax solution amounts to practically the same thing since it gives an alkaline solution through hydrolysis. Chlorinated lime is in the same class. Any alkaline salt will give the same red colouration that is obtained by ammonia in the Bornträger reaction and neutral or acid salts will not give it. Shades or differences in colouration may be due to the presence of various cations in such a variety of salts. The depth of colour produced by equivalent amounts of cascara, aloes, rhubarb and senna, ranges from strong to weak in the order named above.

The Borntrager reaction was carried out on seventy-six samples. In one case the emodin reaction was distinctly negative. In fourteen samples the reaction was very faint. This shows the presence of only traces of cascara at best. All these fifteen samples come in groups 1 and 2.

Although adulteration of these extracts by other drugs was not particularly suspected, tests were attempted on a number of samples for the presence of aloes and rhubarb by means of the borax test and ferrous sulphate. In no case were these tests deemed to be positive although they cannot be taken as absolutely conclusive. Some samples were declared to contain senna. We were unable to positively identify the presence of this drug.

It must be stated once again here that we have not tried to classify these samples in this part of our report strictly according to the way they were sold to our inspectors.

The general public cannot be expected to appreciate the difference between aromatic and fluid extracts of cascara. Although the simple name Cascara Sagrada refers strictly speaking to a bark and not to any particular extract, yet a large number of extracts were sold simply as "Cascara Sagrada." This implies nothing on their part as to the nature of their composition. This may in one sense be considered a case of misbranding. It really is the outcome of the public's attempt to prescribe for itself in semi-intelligent terms. As a rule the manufacturer has taken advantage of the possibilities in the manufacture of aromatic extracts. Licorice and glycerin are found to have unduly displaced the cascara extract that should be present in these samples. These extracts are also unofficial in that they do not contain the required alcohol content.

The liquid and fluid extracts are much nearer official standards, and their intrinsic value as laxatives is, on the average, much greater.

L. E. WESTMAN,
R. M. ROWAT,
Public Analysts.

BULLETIN No. 387—BEANS.

OTTAWA, December 11, 1917.

SIR,—I have the honour to present you with a report upon 318 samples of Beans, as found upon the Canadian retail market in August, September and October of this year.

Beans constitute a highly nutritious food for man, as well as for domestic animals. Konig (Zusammensetzung, etc. Vierte Auaflge, Band 1, S. 1484) quotes the following percentage value:—

		Water.	Protein.	Fat.	Carbohydrates. Starch.	Carbohydrates. Fibre.	Ash.
1	Phaseolus vulgaris	18.20	18.44	0.78	45.32	4.29	3.29
2	" lunatus	10.31	19.56	2.48	46.46	4.93	4.07
3	Soya beans (mean)	14.38	35.43	18.20	15.00	6.48	3.98

It will be noted that the proteid matter of the bean is very high, and this is particularly true of the Soya (Soja) bean, which is also specially rich in fat.

The experiments of Thomas (Lusk, Fundamental Basis of Nutrition, p. 20) show that the protein of beans has a higher nutritive value than that of bread, and nearly twice as high a value as that of Indian Corn.

Using the prices which obtained in New York, in January, 1913, it was found that each 1,000 calories of energy furnished by dried beans, cost 4 cents, as against wheat flour, 2½ cents; wheat bread, 5⅓ cents; milk, 10 cents; mutton, 16¼ cents; sirloin beef, 24 cents.

The bean is readily grown in most parts of the world. In tropical climes it develops a glucoside (Phascolunatin) which yields hydrocyanic (prussic) acid on

hydrolysis, the amount of this acid frequently reaching dangerous quantities, especially in beans grown in Java and Burma. Java beans, coming into France by way of Algeria, caused fatal illness; and in consequence of this a decree was issued in 1912 forbidding the importation of Java beans, and also of other beans found to yield more than 20 parts per 100,000 of prussic acid (equivalent to approximately 20 milligrammes in 3 ounces). The maximum dose permitted by the British Pharmacopoeia for prussic acid is 6 milligrammes; and it will be seen that three ounces of beans (not more than a hungry man might eat at one meal) containing as much as 20 milligrammes would certainly be fatal, unless the poison were got rid of before serving the food.

Fortunately, the nature of ripe beans is such that they cannot be prepared for the table without more or less prolonged soaking, followed by boiling. The prussic acid, being volatile, is thus got rid of in the steam, and residual amounts are usually so small as to be harmless. Nevertheless, cases have come to my notice to prove that serious illness may occasionally result from the use of these beans, although no fatalities are on record in Canada.

Numerous and large consignments of East India Beans have recently come to Canada; and this is particularly the case since the United States has forbidden the entrance of these beans found to contain "appreciable amounts of prussic acid" (Service and Regulatory Announcements, No. 219—published July, 1917).

Up to the present time we have the following record of importations of beans, since June of this year:—

	Via	Port of	
Vancouver (46 described as Soya Beans)	446	Hamilton	2
Victoria	8	St. John, N.B	4
Winnipeg	3	Sudbury	1
Saskatoon	2	Montreal	18
Ottawa	3	Port Arthur	2
Halifax	9	North Bay	1
Belleville	1	Calgary	1
Quebec	4	London	2
Moose Jaw	1		
Toronto	24	Total Importations	532

The above list includes beans of many different varieties. All have been examined as to their prussic acid content and the following synopticizes the result.

Containing no prussic acid	280	samples
" from traces to 10 parts per 100,000	49	"
" " 10 to 15 parts per 100,000	121	"
" " 15 to 20 " "	63	"
" more than 20 " "	19	"
Total	532	

Pending investigation as to the character of the importations into Canada, I advised this Department to adopt the limit set by the French Decree of 1912, and to forbid delivery of any beans found to yield more than 20 parts of prussic acid per 100,000. This recommendation has been acted upon, and as above stated, no fatalities have been reported from the use of these beans.

Several cases of more or less serious illness have however come to the notice of the Department; and it has become a matter of grave importance to decide whether or not the above limit is sufficiently conservative.

Investigation proves that proper soaking and subsequent boiling of the beans, rejecting in the first place the water in which these were originally soaked, is sufficient to render the beans safe as food. Any failure to observe the precautions named, may result in more or less dangerous consequences. It is during the soaking process that the poison is developed, and sufficient time must be allowed for this operation. It is best to let the soaking proceed overnight. By pouring off this water, most of th prussic acid is got rid of, and the subsequent boiling with frsh water makes the

beans quite safe in use, when the total content in prussic acid does not exceed 20 parts per 100,000.

Cases of illness, so far as these have been fully investigated, appear to show that the beans have not been prepared for the table as above described; and in consequence the poison has not been boiled off. Whether due to ignorance or carlessness, the danger is sufficiently real and acute; and it is open to question whether we are justified, even in the present food stringency, in taking such risk as is involved in permitting beans, carrying 20 parts prussic acid per 100,000, to be distributed. As already stated, this limit has been accepted by France since 1912; and I have not heard of any fatalities attending the use of beans, in that country, since the date named. I understand however, that a much lower limit of tolerance is fixed by the United States, and this probably accounts for the very large shipments of these beans to Canada in recent months.

The special object had in view in the collection now reported, was to discover to what extent beans containing prussic acid were distributed in Canada, and the results may be summarized as follows:

Samples yielding no prussic acid	173
" " less than 10 parts	61
" " 10 to 15 parts	40
" " 15 to 20 parts	39
" " above 20 parts	5
Total	318

As already stated, this Department has refused admittance, at all Canadian ports, to beans yielding more than 20 parts prussic acid per 100,000 parts, since June last. It may be that the 5 samples found upon our retail markets, and showing more than 20 parts per 100,000 represent importations delivered before June 1917.

The distribution of these cyanogenetic beans is apparent from the following table of localities in which collections was made:

Inspectoral District	Total samples	Free from prussic acid	Containing prussic acid
Nova Scotia	15	14	1
New Brunswick	15	14	1
Quebec (city)	35	29	6
" (province)	27	21	6
Three Rivers	10	7	3
Eastern Townships	5	5	0
Montreal	15	13	2
Valleyfield	15	14	1
Ottawa	14	3	11
Kingston	13	11	2
Toronto	15	6	9
Hamilton	14	7	7
Windsor	10	7	3
North Ontario	13	7	6
Manitoba	15	0	15
Saskatchewan S	15	0	15
Saskatchewan N	13	0	13
Alberta	15	0	15
Rocky Mountains	14	12	2
Vancouver	15	2	13
Victoria	15	1	14
Total	318	173	145

It is apparent from this statement that these beans are mainly entered at the West seaboard of Canada, and are finding their way eastward; already practically monopolizing the market as far east as Manitoba.

It is very important, from another point of view than that of safety in use, that these eastern beans should be sold under a name which clearly distinguishes between them and beans which are the product of a temperate climate. Their nature is such that when planted in our climate, they do not mature; and it would be quite possible for a farmer to lose the whole season's crop, if, by mistake, he sowed Oriental instead of native beans. I find that the great majority of sales made to our inspectors are simply described as "beans"; 17 sales of these beans were made as "white beans" and 3 as "navy beans". In a few cases only were they sold as "Burma" or "Rangoon" beans; though more frequently as "Japanese" beans. They are not actually the product of Japan, but are usually shipped by way of that country.

It may be necessary to insist upon all beans being offered under a name that shall inform the purchaser regarding the nature of the article; or at least to require that Oriental beans shall not be sold except under a name that shall make it impossible for the purchaser to mistake them for the native variety.

BULLETIN No. 388—REGISTERED FEEDING STUFFS.

OTTAWA, December 17, 1917.

SIR,—I beg to hand you a report dealing with 146 samples purchased as Registered Feeds, by our inspectors, in June, July, and August of this year. Our last report upon this class of Feeds was made in November, 1914, and is published as Bulletin No. 296 of this series.

There appears to be much misunderstanding as regards so called Registered Feeds; and I am of opinion that this misunderstanding is without excuse. The Commercial Feeding Stuffs Act of 1909 makes it quite clear that all Feeds must be sold under a specific registration number, and accompanied by a guarantee of nutritive values, except the following:—

1. Hay and straw;
2. Roots;
3. Unground whole grain, of one kind or in admixture;
4. Meal, the product of grinding the entire grain of one or more kinds.
5. Wet brewers' grain.
6. Bran.
7. Shorts (Middlings).
8. Chop Feed.

This last class is practically identical in character with number 4, except that the grains are merely broken, and not ground to the fineness of meal. The last three classes are defined in detail by Order in Council of May 1, 1911 (published as G. 698) as below:—

"Under the authority of an Order of His Excellency in Council, bearing date the first day of May instant, paragraphs 13, 14 and 15 of the Order in Council of the 29th October, 1910, establishing standards of quality for grain products, have been cancelled and the following substituted in lieu thereof:—

"13. *Bran* is a product of the mililng of wheat or other grain and contains not less than fourten (14) per cent of proteids, not less than three (3) per cent of fat, not

more than ten (10) per cent of crude fibre and must b free from vital seeds of any of the noxious weeds defined by the Governor in Council under 'The Seed Control Act.'

"14. *Shorts or Middings* is the coarser material sifted out from the products of second treatment of the grain by crushing the coarsely ground material that is sifted out from the bran after the first grinding; and contains not less than fifteen (15) per cent of proteids, not less than four (4) per cent of fat, not more than eight (8) per cent of crude fibre and must be free from vital seeds of any of the noxious weeds defined by the Governor in Council under ' The Seed Control Act.'

" 15. *Chop Feed* is whole grain of one or more kinds more or less finely ground, and contains not less than ten (10) per cent of proteids not less than two (2) per cent of fat, not more than ten (10) per cent of crude fibre and must be free from vital seeds of any of the noxious weeds defined by the Governor in Council under 'The Seed Control Act.' "

These amended standards will come into force on the seventh day of June proximo."

Under these regulations it must be quite apparent that, whilst the accidental occurrence of a few weed seeds or other extraneous matters into Bran, Shorts or Chop may not be held to constitute adulteration, so long as the nutrient value of the article is maintained, the purposeful addition of screenings to any of these classes so changes the nature of the Feed that it no longer meets the conditions of definitions.

The only legal way of marketing such a Feed is to register it as a mixture, and to sell it under the conditions of section 5 of the Act.

This is also true of an article which is usually sold as Feed flour (see Bulletin No. 350). Although usually offered as Shorts or Middlings, this material is not such in any proper sense, and should be sold as a registered Feed.

Owing to mistakes on the part of our inspectors, 25 samples of Cattle Medicines are included in this collection. These have not been analyzed but are held over for work and report when this class of articles is taken up. The results of this inspection may be summarized as follows:—

Samples purchased mistakenly	25
Samples which meet legal requirements	53
Samples which nearly meet legal requirements, or possess guaranteed value by compensation	14
Samples sold without registration numbers	25
Samples below legal requirements	20
Samples sold as legal Bran, Shorts &c	9
Total	146

Fourteen samples, which are very slightly below legal requirements, or which contain proteins in such excess above guaranteed value as to fully compensate for deficiency in fat, or vice versa, may perhaps be recommended to be passed, without penalty. In strict legal interpretation, these samples are adulterated under the Act; but the purchaser sustains no loss by this fact.

Twenty-five other samples are sold without attached registration numbers and are therefore illegal These are .subject to penalty under Section 15 of the Act. I have reason to believe that, in several instances, the fault is not due to the manufacturer, who registers his product according to law, but to the retail vendor, who offers the article for sale without furnishing the purchaser with information as he is required by law to do. Section 7 of the Act is as follows:

" The registration number must be affixed by the manufacturer or agent in a plain and legible manner to every package of commercial feeding stuff sold or offered for sale, and shall constitute an identification of the brand. In addition to the registration number, there must be legibly printed, on every package of feeding stuff

sold, the statement set out in schedule A to this Act. This condition shall be held to be fulfilled if a printed tag bearing the registration number and the statement required is securely attached to the package."

I have learned that in some cases it is usual for the manufacturers to furnish necessary tags, leaving to the retailer the responsibility of affixing these tags to packages sold. Whether or not the manufacturer guards himself from penalty by such procedure would have to be decided by the courts. This Department must hold the immediate vendor responsible since he alone is in a position to know the facts.

Twenty samples fail to meet guaranteed values; and of course such samples are adulterated under the Act.

BULLETIN No. 390—FLAVOURING SYRUPS, Etc.

OTTAWA, December 19, 1917.

SIR,—I would respectfully call your attention to the fact that, during recent years, this department has frequently been asked to look into the matter of fruit syrups and kindred preparations as supplied to the trade for use in soda fountain beverages. We have been prevented from taking up the subject earlier by press of other work; but in June of this year I caused a collection of 141 samples to be made in the cities and principal towns of Canada, and these have been carefully worked over, with results as inclosed. The investigation was placed in charge of Mr. Geo. H. Brother of this staff, and his report is herewith submitted.

An Order in Council of February, 1911 (published as Circular G. 947) defines fresh fruit juices and sweet fruit juices; but only in very general terms, and without special regard to the employment of these articles for soda fountain use. The beverages offered at these fountains are not usually claimed to be fruit juices, but are essentially ærated water (soda water) flavoured with a fruit juice, which may be actually such, or may be a synthetic preparation imitating the fruit which gives its name to the drink. In the latter case, the satisfactory character of the preparation, so far as flavour is concerned, will depend upon the skill of the manufacturer; and provided that the ingredients are harmless, and that the article is properly described as an imitation, and not as a true fruit juice, there is no ground for complaint. The employment of preservatives and dyes, under the conditions of G. 1111 and G. 1167 is permitted.

These soda fountain syrups are now so largely used that it is desirable to define them more closely than at present is the case under G. 947; and it was mainly with a view to obtaining information regarding them that the work herein reported was undertaken.

Three of the samples, sold as orange flavouring syrups, contain no sugar; and are not syrups, two being concentrated fruit juices, preserved with salicyclic acid

and formaldehyde, and one a synthetic preparation. The remainder are true syrups (containing sugar) and the results of their examination are summarized as follows:—

Name.	Total samples.	Source of Flavour.			Dyes.			Preservatives.				
		Natural.	Synthetic.	Doubtful.	None.	Certified.	Uncertified.	None.	Ben. acid.	Sal. acid.	Formal-dehyde.	Alcohol.
(1) Strawberry	27	23	2	2	9	12	6	8	14	2	2	1
(2) Pineapple	22	21	1	0	21	1	1	10	7	2	2	1
Cherry	21	20	0	1	2	13	6	7	6	7	1	0
Lemon	18	7	8	3	4	10	4	12	1	4	1	0
Orange	15	6	6	3	3	2	10	5	3	5	2	0
Raspberry	11	7	0	4	1	9	1	3	6	1	1	0
Vanilla	7	6	1	0	7	0	0	5	0	1	1	0
Chocolate	6	6	0	0	6	0	0	6	0	0	0	0
Peach	3	3	0	0	3	0	0	0	2	0	1	0
Coffee	1	1	0	0	1	0	0	1	0	0	0	0
Ginger,	1	1	0	0	1	0	0	0	0	1	0	0
Sarsaparilla	1	0	1	0	1	0	0	1	0	0	0	0
Rose	1	0	0	1	0	0	1	0	0	0	1	0
Fig	1	1	0	0	1	0	0	0	1	0	0	0
3) Claret	1	0	0	1	0	0	1	0	0	1	0	0
Grape	1	0	1	0	0	0	1	0	1	0	0	0
(4) Rainbow	1	1	0	0	0	1	0	0	1	0	0	0
Apricot	1	1	0	0	1	0	0	0	1	0	0	0
Banana	2	0	2	0	1	1	0	0	2	0	0	0
	141	104	22	15	62	49	31	58	47	22	12	2

(1) Alcohol 19·18 p c. volume.
(2) " 35·51 "
(3) Contains no alcohol.
(4) Mixture cherries and pineapple.

The information furnished herewith will assist your Advisory Board in defining soda fountain syrups:

December 14, 1917.

Dr. A. McGill,
Chief Analyst.

Dear Sir,—I beg leave to submit the following report on the examination of 141 samples of fruit juices or syrups for soda fountains as used throughout the Dominion.

There is no specific definition for this class of products given in the Adulteration Act, though in G. 947 (February 11, 1911), are the following:—

1. *Fresh Fruit Juices.*—1. "Fresh fruit juices are the clean, unfermented liquid products obtained by the first pressing of fresh, ripe fruit, and correspond in name to the fruits from which they are obtained, and contain not more than two (2) per cent of alcohol by volume."

4. *Sweet Fruit Juices, Sweetened Fruit Juices, Fruit Syrups.*—1. "Sweet fruit juices, sweetened fruit juices, fruit syrups, are the products obtained by adding sugar (sucrose) to fresh fruit juices, and correspond in name to the fruits from which they are derived."

It is worthy of note that in neither of the above definitions is there any mention of synthetic fruit syrups, i.e., syrups made from synthetically prepared esters and acids imitating those found in the natural fruit, nor of the addition of preservatives and artificial colouring matter.

Since, as I have stated above, there are no specific standards set for fruit syrups intended for fountain use, it is important that deviations from the existing standards be examined to determine whether or not they should be classed as adulterations. Of course syrups containing substances harmful to health will not be considered under this head: there is absolutely no doubt or question as to their adulteration, on other grounds than that they are a menace to the health of the public.

Synthetic Fruit Syrups.—The use of synthetic, or manufactured preparations for flavouring purposes, such as methyl salicylate for oil of wintergreen, vanillin or coumarin for vanilla extract, ethyl butyrate for pineapple, etc., is quite common. They are cheaper and easier to prepare than the natural extracts, hence bring the manufacturer larger profits if they can be sold at approximately the same price charged for extracts. These preparations are inferior to the natural extracts, since the latter owe their delicate flavour to resins and traces of other esters besides the principal one; the former are practically nothing but an alcoholic solution of the principal ester. The result is that, while the preparation may be stronger (in the sense that less is required to produce the flavour), the natural extract is the more pleasing to the taste. To protect the public and yet permit the sale of synthetic preparations, an Order in Council (G. 1276, April 7, 1917) requires the synthetic preparations to be labeled "Imitation" or "Artificial" in letters as large as the rest of the label.

The problem of protection is somewhat different in the present case, since the public purchases fountain flavours only in mixtures. It is, of course, possible and desirable that manufacturers of syrups be required to conform to a regulation similar to that cited above, but this would protect the vendors only. In order to protect the general public, I would recommend a requirement that fountain drinks or preparations flavoured with synthetic flavours be sold over the counter as "mock" strawberry, "mock" pineapple, etc., as the case may be, and that they be so listed or described on the printed menus.

Preservatives.—There is no strong objection to the use of the permitted preservatives (G. 1111, April 15, 1914) in this class of fruit syrups. The syrup is so diluted when sold to the consumer that none of the listed preservatives would be harmful, even though present in somewhat larger quantities than permitted. It is true there remains the question as to whether any other preservative than the sugar is necessary. Barnard (Chem. Abst. 3 (1909), 2475), claims that fruits preserved in 10 pounds sucrose per gallon of water keep at least seven days, exposed to room temperature during the day and placed in a refrigerator at night; if preserved in 14 pounds sucrose, a syrup results "sufficiently heavy for all practical purposes" which keeps under any ordinary conditions. As no work along these lines has been done in this laboratory up to the present time, we are unable to comment on Barnard's work. As stated above, however, there is no reason why permitted preservatives in reasonable amounts should not be used, provided they are declared by the manufacturer on the label.

Artificial Colouring.—Freshly prepared fruit syrups are beautifully coloured, due to the natural pigments present in the fruit. Exposure to light causes most of these colours to fade, often to a very unpleasing shade. The fruit itself is not affected, but its appearance renders it unattractive. This would unjustly and seriously affect the business of the dispenser, were it not possible to reproduce nature's colours by the addition of small amounts of harmless dyes. The Department has, therefore, certified in G. 1167, January 18, 1915, seven aniline dyes for use in colouring of foods, as follows: Amaranth 107, Ponceau 3R 56, Erythrosin 517, Orange 1-85, Napthol Yellow S4, Light Green SF Yellowish, 435, Indigo Carmine 692, and in G.

1278, April 21, 1917, Tartrazine 94. The numbers refer to the classification by Schultz and Julius, as edited by Arthur G. Green.

Among these eight certified colours are found the three primary colours (red, blue and yellow) as well as the complementaries, orange and green. They are sufficient, therefore, to satisfy every demand, since combining two or more of them practically any colour or shade may be produced. The United States have eight certified colours: Amaranth 107, Ponceau 3R 56, Orange 1-85, Tartrazine 94, and Indigo Carmine 692. Erythrosin 517, Napthol Yellows 4, Light Green S. F. Yellowish 435, The National Aniline and Chemical Company, Inc., of New York, has combined these so as to produce fifteen shades and colours besides the original certified eight, which they sell under such trade names as "Strawberry Red," "Deep Chocolate," "Yellow Colour, Egg Shade," etc. They have kindly furnished us with samples of all their certified colours for food products and confectionery. Investigation of these samples has demonstrated the fact that manufacturers of fruit syrups have here every colour and shade of the natural fruit, so have no excuse for the use of any but certified colours. As will be shown later, the majority of samples of fruit syrups examined were found coloured with certified dyes, a fact much to the credit of the manufacturers as this is the first examination of this class of fruit syrups, as well as the first investigation of dyes used to colour food products in this laboratory.

The method used for the detection and identification of the dye is outlined in the Journal of the Association of Official Agricultural Chemists (J.A.O.A.C, 2, 161). A piece of white woollen yarn is boiled for about fifteen minutes in the solution to be tested, to which a few drops of hydrochloric acid have been added. It is then removed, washed well with water and dried. If an aniline dye is present in the solution, the wool will be fast dyed. When dry it is cut into four pieces, which are treated with concentrated hydrochloric and sulphuric acids, and dilute solutions of sodium and ammonium hydroxides. The colour reactions are noted and by means of a table of these reactions the dye is identified. This identification can be regarded as only approximate, as the method is rather crude, some of the reactions as given in the table being questionable. For example Amaranth 107, according to the table, gives reactions which we could not duplicate with samples of the pure dye. To show these discrepancies, we will copy the reactions as given in the table and under them give those we obtained with two separate samples of the pure dye:—

—	Hydrochloric.	Sulphuric.	Sod. Hydrox.	Ammonia.
Given.....	Slightly darker.	Violet to brownish.	Dull brownish.	Little change.
Found.....	Deep red.	Violet.	Red.	Red.

There is no doubt about the violet colour with sulphuric acid, as the table would lead one to believe; not only did the two samples of pure Amaranth 107 give a very decided violet colour but also five red compound colour (strawberry red, etc.) showing Amaranth to be the base dye used in their construction.

Several syrups contained dyes we were unable to identify; these we classed as "artificial" dyes and considered them uncertified. The subject of dyes and their identification is being further investigated and we hope soon to get out our own table of colour reactions and a more rigorous method than that described above. We are much indebted to Mr. W. H. Watkins, chief chemist of the Buffalo factory of the National Aniline and Chemical Company, Inc., for assistance on this subject.

In order to facilitate comparison, tables have been prepared in which the data on all samples of the same flavour is listed. This also permits more extended remarks and criticism than would be possible were the data given in one large table.

STRAWBERRY (27 SAMPLES.)

Sample No.	Analyzed at.	Dye.	Preservative.		Sucrose p. c.	Analyst's Description.
			Substance.	p. c.		
76602	Halifax	Amaranth 107	None			Genuine syrup.
76605	"	Ponceau 3R 56	"			Doubtful syrup.
78045	"	None	"			Genuine syrup.
78046	"	"	"			Genuine fruit.
71216	"	Amaranth 107	"			Genuine syrup.
65261	Ottawa	None	Benzoic acid	0·0619	36·27	Genuine fruit.
65264	"	"	"	0·1135	7 02	Genuine fruit.
65269	"	Amaranth 107	"	0·2167	26·05	Genuine syrup.
72591	"	None	None		29·44	Genuine syrup.
77515	"	Artificial	Alcohol	19·18	2·56	Synthetic syrup.
77534	"	Ponceau 6R 108	None		27·15	Genuine syrup.
77864	"	Amaranth 107	Benzoic acid	0·0980	45·39	Genuine fruit.
77866	"	None	"	0·1342	24·86	Genuine syrup.
77965	"	"	Salic. acid	Trace.	12·90	Genuine fruit.
77966	"	Ponceau 3R 56	Benz. acid	0·0929	22·56	Genuine syrup.
77970	"	Amaranth 107	Formalin	0·0174	0·00	Synthetic syrup.
77971	"	None	Benz. acid	Trace.	37·14	Genuine fruit.
77972	"	"	Formalin	0·0054	13·28	Genuine fruit.
74084	"	Artificial	Salic. acid	0·0168	42·07	Genuine fruit.
75328	Winnipeg	Palatine Red 62	Benz. acid	Trace.	33·12	Genuine syrup.
52696	"	Amaranth 107	"	"	26·28	Genuine syrup.
52701	"	" 107	None		42·38	Genuine syrup.
68423	Vancouver	Ponceau 3R 56	Benz. acid	0 057	11·31	Genuine syrup.
75923	"	Erythrosin 517	"	0·001	59·50	Doubtful syrup.
75930	"	Ponceau 3R 56	"	0 144	13·38	Genuine fruit.
75863	"	Crystal Ponc. 64	"	0·0932	35·34	Genuine syrup.
75867	"	Palatine Red 62	"	0·0568	37·40	Genuine fruit.

In the 27 samples of strawberry flavour examined, 2 were found to be synthetic preparations, 2 doubtful, and 23 genuine, 8 samples contained no preservative, 14 small amounts of soda benzoate, 2 salicylic acid, 2 formaldehyde and 1 alcohol. Of the 18 samples which were artificially coloured, but six contained an uncertified dye.

PINEAPPLE (22 samples.)

Sample No.	Analyzed at.	Dye.	Preservative.		Sucrose p. c.	Analyst's Description.
			Substance.	p. c.		
76606	Halifax	None	None			Genuine syrup.
76610	"	"	"			" "
78043	"	"	"			" fruit.
78050	"	"	Salic. acid	Trace		" syrup.
71219	"	"	None			" "
7488	Ottawa	"	"		42·26	" "
65263	"	"	Formalin	0·0171	18·35	" "
65270	"	"	None		14 19	" "
72593	"	"	Formalin	0·0876	43·59	" "
77512	"	"	Benz. acid	0 0929	50·14	" "
77514	"	Artificial	Alcohol	35·51	15·34	Synth. "
77865	"	None	Salic. acid	0·0544	56·46	Genuine fruit.
77869	"	"	Benz. "	0·1548	57·18	" syrup.
77967	"	"	None		19·86	" fruit.
75325	Winnipeg	"	"		36·16	" syrup.
52697	"	"	"		17·32	" "
68420	Vancouver	"	Benz. acid	0 045	48·29	" "
68443	"	"	" "	0·009	46·80	" "
75922	"	"	" "	0·020	60 85	" "
75931	"	"	" "	0·101	39·37	" fruit.
75864	"	"	" "	0·1084	55·81	" syrup.
75868	"	"	None		1·28	" fruit.

There was but one synthetic syrup in the twenty-two samples of pineapple flavour examined. This preparation was the only artificially coloured sample. Ten samples contained no preservative other than sucrose, seven contained benzoate of soda, two salicylic acid, two formaldehyde and one alcohol.

CHERRY (21 samples.)

Sample No.	Analyzed at.	Dye.	Preservative.		Sucrose p. c.	Analyst's Description.
			Substance.	p. c.		
78047	Halifax. ...	Ponceau 3R 56....	None	.....	.....	Gen syrup.
71220	"	Amaranth 107 ...	"	.....	... ...	Doubt. syrup.
7487	Ottawa.....	" "	Salic. acid	0·046	49·26	Gen. "
72597	"	" "	" "	0 006	11·16	" "
72599	"	" "	" "	0·004	47·79	" "
77513	"	None	" "	0.016	22·15	" fruit.
77517	"	Palatine Red 62...	None...	.....	17·95	" syrup.
77533	"	Ponceau 3R 56....	Formalin*.....	0·003	1·40	" fruit.
77572	"	Napth. Yel. S 4...	Salic. acid*..... .	0·019	15·22	" " (mint).
77867	"	Palatine Red 62...	None...	.....	4·75	" fruit.
77964	"	Artificial..... .	Salic. acid	0·012	39 66	" "
74085	"	Magenta 448.....	" "	0·023	32·91	" "
75327	Winnipeg.....	Palatine Red 62...	Benz. "	Trace.	22·49	" syrup.
79508	"	Cryst. Ponceau 64	None..	.....	66·30	" "
52731	"	Amaranth 107. ...	"	.....	51·70	" "
68418	Vancouver-..	Ponc. 3R 56..... .	Benz. acid}.	0·054	6·54	" "
68441	"	Amaranth 107.....	" "	0·094	16·69	" "
75925	"	" "	" "	0·01	46·36	" "
75928	" ...	Ponc. 3R 56.....	" "	0·076	3·47	" fruit.
75869	" ...	None	None.....	.....	1·28	" "
75871	"	Amaranth 107 ...	Benz. acid	0·111	8·36	" "

* Benzoate declared.

Of the twenty-one samples examined, one was doubtful, the remaining twenty genuine. All were found to be coloured but two, thirteen with certified dyes and six with others. Seven contained no other preservative than sucrose, six sodium benzoate, seven salicylic acid and one formaldehyde.

Six samples (Nos. 77513, 77533, 77867, 77964, 75928 and 75871) were labeled and sold as "Maraschino cherries." Steps should be taken to require manufacturers of this class of goods to label their product in a less deceiving manner, since these were not maraschino cherries. The following extract from Food Inspection Decisions, United States Department of Agriculture, F.I.D. 139 (Chem. Abst. 6, (1912), 1473) first defines the term, then places regulations on the labeling of products similar to the above: "Maraschino is a liqueur or cordial prepared by fermentation and distillation from a small wild Dalmatian cherry. Imitations of maraschino should be labelled "imitation." Cherries of other varieties preserved in maraschino liqueur may be called "cherries in maraschino," or if preserved in a syrup flavoured with maraschino alone, may be called "cherries, maraschino flavour" or "maraschino flavoured cherries." Sample No. 75869, put out by the Liquid Carbonic Company of Chicago, conforms to the above: it is labeled "cherries, imitation maraschino flavour."

LEMON (18 samples.)

Sample No.	Analysed at.	Dye.	Preservative.		Sucrose p. c.	Analyst's Description.
			Substance.	p. c.		
76601	Halifax	Tartrazine 94	None			Doubtful syrup.
78042	"	"	"			Synthetic syrup.
78048	"	None	"			Genuine syrup.
71215	"	Tartrazine 94	"			Synthetic syrup.
71217	"	Orange 1 85.	Salic. acid	Trace		" "
71221	"	Tartrazine 94	None			" "
71222	"	Artificial	"			" "
5652	Ottawa	Napth. Yel. S 4	Salic. acid	0·023	54·54	Genuine syrup.
7486	"	None	"	0·031	39·49	" "
65265	"	"	None		63 92	" "
72596	"	Auramine 425	Formalin	0·022	32·62	" "
72600	"	"	None		57 36	Synthetic syrup.
77851	"	Tartrazine 94	Salic. acid*	0·034	2·09	Genuine syrup.
74081	"	Quin. Yel. 667	None		44·18	" "
52693	Winnipeg.	None	"		46·18	Doubtful syrup.
68419	Vancouver	Napth. Yel. S 4	"		57·42	" "
68442	"	"	Benz. acid	0·063	55·76	Synthetic syrup.
75862	"	"	None		47·07	" "

* Benzoate declared.

Genuine flavours, 7; synthetic, 8; doubtful, 3. The dyes show a better proportion, only four samples being coloured with uncertified dyes. Twelve samples were found to be preserved with sucrose alone, four with salicylic acid and one each with sodium benzoate and formaldehyde. The explanation for the large percentage of synthetic preparations of this flavour is probably found in the fact that of all flavours, lemon and orange are the easiest and probably the most commonly reproduced. It is well known that the so-called "circus lemonade" is nothing but a water solution of citric or tartaric acid, sweetened and coloured.

ORANGE (15 samples).

Sample No.	Analyzed at	Dye.	Preservative.		Sucrose. p.c.	Analyst's description.
			Substance.	p.c.		
76608	Halifax.	None	None			Gen. syrup.
78041	"	Artificial	"			Comp syrup.
71218	"	Orange 1 85.	Salic-acid	0·023		"
5653	Ottawa.	Meth. Orange	Formalin	0·014	33·06	"
7485	"	Orange 1 85.	Salic. acid	0·015	52·72	Genuine syrup.
65260	"	Artificial.	Benz. acid	0·057	59·65	"
77516	"	Orange G 14	Salic. acid	0·020	00·00	"
77868	"	Croceine Or. 13	Benz. acid	0·170	2·61	"
78612	"	Orange IV 88	Formalin	0·013	00·00	"
75326	Winnipeg.	None	None		00·00	Syn. syrup.
79506	"	Orange 11 86.	Benz. acid	Trace.	30·39	"
52695	"	Croceine Or. 13	"	"	20·82	Doubt. syrup.
52699	"	None	None		59·40	"
68417	Vancouver.	Orange 11 86.	"		60·24	"
75926	"	"	Benz. acid	0·013	54·88	Syn. syrup.

Six genuine, three compound, three synthetic and three doubtful. Ten samples were found coloured with forbidden dyes. This must be due to ignorance since no samples were more brilliant in colour than those dyed with orange 1 85. Five samples contained no added preservative (one, No. 75326, not even sucrose), three salicylic acid; five benzoic acid; two formaldehyde.

RASPBERRY (11 samples.)

Sample No.	Analyzed at	Dye.	Preservative.		Sucrose. p.c.	Analyst's description.
			Substance.	p.c.		
78049	Halifax.....	Amaranth 107	Benz. acid.....	0·032	.....	Doubt. syrup.
71223	"	"	None.....	.....	.....	Gen. syrup.
72594	Ottawa... ..	None..... ...	Formalin. ..	0·089	11·36	Gen. fruit.
77535	"	Amaranth 107 ...	Benz. acid.....	0·266	1·23	Gen. syrup.
77969	"	"	Salic. acid.....	0·017	37·14	"
74082	"	"	None.....	.....	55·76	Doubt. syrup.
75330	Winnipeg.....	Palatine Red 62...	Benz. acid.....	Trace.	21·57	Gen. syrup.
52702	"	Amaranth 107	None	. .....	38·59	Doubt. syrup.
68421	Vancouver...	"	Benz. acid.....	0·181	1·30	"
75866	"	"	"	0·059	13·73	Gen. fruit.
75924	"	Ponceau 3R 56....	"	0·019	48·46	Gen. syrup.

Out of eleven samples examined, seven were found to be genuine and four doubtful. Only one sample was coloured with an uncertified dye. Three samples contained no preservative, six benzoic acid, one salicylic acid and one formaldehyde.

VANILLA (7 samples).

Sample No.	Analyzed at.	Dye.	Preservative.		Sucrose. p. c.	Analyst's description.
			Substance.	p. c.		
76607	Halifax.	None.....	None.....	.....	.....	Gen. syrup.
78044	"	"	"	.....	.....	" "
5654	Ottawa.....	"	Formalin...	0·018	36·59	Syn. "
5655	"	"	Salic. acid.... ...	0·011	37·08	Gen. "
74083	"	"	None.....	.....	57·49	" "
75334	Winnipeg.....	"	"	.....	56·82	" "
52698	"	"	"	.....	50·59	" "

There was but one synthetic preparation (flavoured with coumarin) in the seven samples examined. Aniline dyes were found in none, though No. 75334 was coloured with caramel. Two contained small amounts of foreign preservatives, salicylic acid and formaldehyde.

CHOCOLATE (6 samples).

Sample No.	Analyzed at.	Dye.	Preservative.		Sucrose.	Analyst's description.
			Substance.	p. c.	p. c.	
76603	Halifax...	None.....	None.....	.....	... ...	Gen. syrup.
72592	Ottawa. ...	"	"	.....	48·66	" "
72595	"	"	"	.....	29·82	" "
72598	"	"	"	.....	43·98	" "
79511	Winnipeg.....	"	"	... .	61·60	" "
52700	"	"	"	... .	44·40	" "

No comment is necessary on the above; it speaks for itself.

PEACH (3 samples).

Sample No.	Analyzed at.	Dye.	Preservative.		Sucrose.	Analyst's description.
			Substance.	p. c.	p. c.	
65262	Ottawa..	None.....	Formalin.....	0·050	44·17	Gen. syrup.
77871	"	"	Benz. acid.....	0·059	17·31	" "
75870	Vancouver....	"	"	Trace.	31·58	" "

All genuine, none dyed. Two were preserved with sodium benzoate and one with formaldehyde.

MISCELLANEOUS (11 samples).

Sample. No.	Analyzed at.	Flavour.	Dye.	Preservative.		Sucrose.	Analyst's description.
				Substance.	p. c.	p. c.	
76604	Halifax.....	Coffee.....	None..	None.....	.....	.....	Gen. syrup.
76609	"	Ginger.....	"	Salic acid...	Trace.	.....	" "
71224	"	Sarsaparil..	"	None.....	.....	.....	Syn. "
65259	Ottawa.....	Rose.....	Aniline Yel. 7.....	Formalin...	0·018	45·88	Doubt. "
77870	"	Fig.....	None	Benz. acid..	0·170	43·08	Gen. fruit.
77872	"	Claret. ...	Artificial.....	Salic. " ..	0·019	51·40	Doubt. syrup.
77968	"	Grape. ...	Indigotine P. 693..	Benz. " ..	0·075	00·00	Syn. "
75865	Vancouver....	Rainbow...	Erythrosin 517....	" " ..	0·170	8·74	Gen. fruit.
75929	"	Apricot. ..	None.	" " ..	0·082	29·88	" "
68422	"	Banana....	Ponceau 3R 56...	" " ..	0·110	42·60	Syn. syrup.
75927	"	" . ..	None.	" " ..	Trace.	56·26	" "

Six genuine, four synthetic and two doubtful. Three samples were coloured with uncertified dyes. Six were found to contain sodium benzoate, two salicylic acid, and one formaldehyde.

In the collection were found three extracts (7451, lemon; 7495, vanilla; 7450, pineapple) and a soft drink (No. 75331, loganberry) collected by mistake.

Summary.—In the total number of syrups examined (141), one hundred and four were found to be genuine, twenty-two synthetic and fifteen doubtful. There were only thirty-one samples coloured with uncertified dyes. Fifty-eight samples contained no added preservative, forty-seven benzoic acid or benzoates; twenty-two salicylic acid; twelve formaldehyde and two alcohol. Such low percentage of synthetic preparations and syrups coloured with uncertified dyes in this representative collection, indicates that it will be a comparatively easy matter to enforce the standards as recommended in the first part of this report.

GEO. H. BROTHER,
Assistant Analyst.

BULLETIN No. 391—CANNED FISH.

OTTAWA, 30th January, 1918.

SIR,—I have the honour to report upon the examination of 275 samples purchased by our inspectors as Canned Fish. The collection was made in June, July and August, 1917, and may be classified as follows:

Salmon	166 samples.	Shrimp	1 sample.
Sardines	39 "	Abalone	1 "
Herring	20 "	Bloater	1 "
Lobsters	9 "	Trout	1 "
Clams	6 "	Spratts	1 "
Finnan Haddie	6 "	Crab	1 "
Oysters	5 "	Small Fish	1 "
Mackerel	5 "	Corned Beef (by mistake)	1 "
Tuna	5 "		
Scallops	4 "	Total	275 "
Cod	2 "		

The following points have been kept in view in this examination:

1. The soundness and quality of the fish.
2. The corrosion or other spoiling of the container (tin.)
3. Net weight of contents, total.
4. Net weight of contents, solid.

Salmon.—Out of a total of 275 samples, our inspectors have purchased 166 samples of Salmon; indicating that this is by far the kind of fish most in evidence. 138 of these samples represent what are generally assumed to be *one pound* tins; 28 samples represent nominal half pound tins.

Of the samples contained in 1 pound tins, 110 are sound and good; 7 show softened and more or less disintegrated flesh, but nothing to indicate decomposition. These samples are probably several years old. Three samples are spoiled by decay. In 18 samples the tin is slightly corroded, and the contents stained with iron. These, like those showing softened flesh, are presumably several years old.

Of samples contained in half pound tins, 26 were found to be in good condition; 2 samples showed more or less corrosion of the container, but the contents were good

The net weight contents of these tins is fairly satisfactory, approximating 16 to 17 ounces in the nominal one pound tins, and 8 to 9 ounces in the half pound size.

If, however, the drained solids are considered, while these approximate 14 ounces in most samples, the variation in weight is noteworthy. Thus:

For nominal 1 pound tins.

Samples containing more than 14 ounces	26
" " 13 "	63
" " 12 "	39
" " 11 "	10
Total	138

For nominal ½ pound tins.

Samples containing more than 8 ounces	2
" " 7 "	14
" " 6 "	11
" " 5 "	1
Total	28

The excess net weight, above the solids, is of course water. Inevitably more or less water must be present, and this averages about 3½ ounces for the one pound tins, and about 2 ounces for the half pound tins. I think it desirable that any statements of weight of contents should refer definitely to the solid contents only, which alone have actual value to the consumer.

Sardines.—39 samples are reported. Of this number, 28 were found to be in good condition. In one case only were the contents spoiled by decay. In 10 samples the tin container was more or less attacked, but the contents were sound. These samples are presumably old stock.

Herring.—Of 20 samples examined, 14 were found to be in good condition. In 6 samples, the tin container was more or less blackened; but the contents were sound.

These fish unlike the salmon are not packed in containers of approximately uniform size. The dry solids vary all the way from 2 ounces to more than 16 ounces in quantity. It is greatly to be desired that containers of 1 pound and ½ pound size should be employed in packing herring, as well as salmon.

Lobsters.—Nine samples were examined and all were found to be in good condition. The solid contents varied from 3·8 ounces to over 8 ounces in weight.

The following suggestions are offered in connection with this investigation.

1. It is much to be desired that the date of packing should be stamped on the tin, in the case of fish products.

2. Tins of standard size, in definite relation to the weight of 1 pound should be used in packing fish.

3. The weight of contents should appear on the tin, and should have reference to the solid matter.

4. The food value, expressed in calories, should be printed on the label. It would probably be simpler to state this in calories per pound of solid matter, for the contained species, than for the actual contents of the tin. If the actual weight of contents were given, the actual calorific value of contents could be easily calculated.

Another, and possibly a better way of expressing the food value, would be to state the value in proteids and fat for the contained species. This should be stated in ounces per pound. Thus: for Salmon = each pound contains 3·157 ounces of proteids and 1·718 ounces of fat. (Konig.)

BULLETIN No. 392—SAUSAGES.

OTTAWA, December 29, 1917.

SIR,—I have the honour to hand you a report upon 123 samples of sausages, purchased variously throughout Canada by our inspectors. The order for collection was issued in August last, but inspectors were instructed to await special instruc-

tions from the analysts, so that samples might be dealt with promptly upon being received at the laboratories. This condition was necessary, on account of the readily perishable character of the article.

Departmental standards for sausages, as published in Circular G. 931, of October, 1910, require as follows:—

> 2. Sausage, sausage meat, is a comminuted meat from swine or neat cattle, or a mixture of such meats, either fresh, salted, pickled or smoked, with added salt and spices and with or without the addition of edible animal fats, cereals, blood and sugar, or subsequent smoking. It contains no larger amount of water than the meats from which it is prepared contain when in their fresh condition, and not more than ten (10) per cent of its weight of cereals; and if it bears a name descriptive of kind, composition or origin, it corresponds to such descriptive name. All animal tissues used as containers, such as casings, stomachs, etc., are clean and sound and impart to the contents no other substance than salt.
>
> 3. Blood sausage is sausage to which has been added clean fresh blood from neat cattle or swine in good health at the time of slaughter.

Nothing is said as regards the employment of dyes in sausages; but this matter is covered by an Order in Council of January 9, 1915 (published as Circular G. 1167), which requires that, so far as all except certain named classes of foods are concerned, "the presence of artificial colouring matter must be declared upon the label in easily legible type." A list of permitted dyes is also furnished in the circular referred to.

The difficulty of carrying out the provisions of G. 1167 in the case of sausages will be at once apparent. It might be possible to secure the proper labelling of the article by the large manufacturer; but. in selling at retail, as well as in the case of smaller makers of sausages, whose trade is purely local, the difficulty would be so great as to be practically insurmountable. At least, this is the claim of the trade.

Recognizing this fact, the Veterinary Director General has prohibited altogether the use of dyes in sausages manufactured in establishments under supervision of inspectors of the Department of Agriculture; and the regulations thus authorized have been faithfully carried out by inspected factories. There exist, however, a very large number of smaller factories, which, not doing an interprovincial or export trade, are not subject to supervision under the terms of the Meat and Canned Foods Act. Certain of these smaller factories have found it profitable to use dyes in their products, and in some localities a very considerable demand for sausages made with dyed meat is claimed to have been developed, to the injury of those manufacturers who are forbidden to employ dyed meats.

The collection herein reported was intended to include only the products of such factories as are not working under the inspection of the Department of Agriculture; and our inspectors were especially instructed to secure, for analysis, only sausages of the kind indicated. Most of the samples, as will be seen, are manufactured locally, and are made by the immediate vendor of the article. Out of the whole number (123) only four (4) samples are found to be made with dyed meats, one in Halifax, the other three in Ottawa. If this result may be taken to indicate the extent to which sausage meats are dyed in Canada, it must be held that this usage is very limited.

In four other instances, the casing of the sausage is dyed; but this does not constitute a violation of G. 1167 in Bologna sausage, where the casing is not eaten, and where the dye does not penetrate to the edible portion of the sausage.

I have, of necessity, adjudged the four cases above referred to, as adulterated under the Act; but in view of the recognized difficulty already mentioned of labelling sausages, I may be permitted to recommend leniency, without prejudice to further

decisions of the kind. Should later investigation show that the dyeing of sausage meats has any considerable vogue, it may be advisable to suggest a means by which the public shall be properly informed of the presence of a dye other than the use of a label.

Another matter regarding which complaint has been made, is the introduction of excess of cereals into sausage, with a view to reducing the cost and of enabling a higher water content to be held than would otherwise be possible.

Our standards permit 10 per cent by weight of cereal to be present, and this limit is not reached by any of the samples now reported. I am inclined to believe that our limit for cereals is quite unnecessarily high. In some States of the American Union the limit permissible is fixed at two (2) per cent; and the fact that only 26 samples out of 123 samples are found to contain above 5 per cent of starch would seem to indicate that our present limit is excessive.

It is usually assumed that cereals are employed for the purpose of enabling a large amount of water to be held by the sausage. There is nothing in the results herewith furnished which could justify such assumption in the samples analyzed. The highest water content is found in samples containing very little cereal; in some cases less than one per cent, and conversely, samples with a high cereal content are found to contain very reasonable water percentage.

Moisture in Sausages.—This is required to be present in no larger amount than the meats from which they are prepared contain when in their fresh condition. It becomes important, in this connection, to ascertain and fix legal limits for this amount. The following data are available:—

Quoted from "Food Inspection, etc.," A. E. Leach, 2nd Edn., pp. 213 to 216. The tables are calculated from experimental work by Atwater:—

—	Beef.	Veal.	Mutton.	Lamb.	Pork.
Chuck—					
Lean	71·3	76·3	64·7	.....	
Medium	68·3	73·3	50·9	56·2	
Fat	62·3	.....	40·6	.....	
Ribs—					
Lean	66·0	72·7	.....	.....	
Medium	55·5	60·9	.....	.....	
Fat	48·5	.....	.....	.....	
Loin—					
Lean	67·0	73·3	.....	.....	60·3
Medium	60·6	69·0	50·2	53·1	
Fat	54·7	61·6	43·3	.....	41·8
Rump—					
Lean	65·7	.....	.....	.....	60·0
Medium	56·7	.....	.....	.....	
Fat	47·1	.....	.....	.....	38·7
Round—					
Lean	70·0	.....	.....	.....	
Medium	65·5	.....	.....	.....	
Fat	60·4	.....	.....	.....	
Leg—					
Lean	.....	73·5	67·4	.....	
Medium	.....	70·0	62·8	63·9	
Flank—					
Medium	.....	.....	46·2	.....	
Shoulder	.....	.....	.....	.....	51·2

König, quoted by Allen, "Com. Org. Analysis," Vol. VIII, 4th Edn., p. 262, gives the following percentages, which refer to the whole animal:—

Ox—very fat	55·42
" medium	73·25
" lean	76·71
Cow—fat	70·98
" lean	76·35
Mutton—very fat	47·91
" medium	75·99
Horse flesh	74·27

The following are supplied by the authors named, and are quoted from Allen v.s.:—

Average ox flesh	76·7	(Munk's Physiologie).
" calf's flesh	75·6	" "
" pig's flesh	72·6	" "
" horse's flesh	74·3	" "
" fowl's flesh	70·8	" "
Mutton chop (boneless)	44·1	(Church).
Calves' liver	72·3	(Payen).
Sheep's kidneys	78·2	"

It will be noted that pig's flesh (pork) contains decidedly less water than other flesh, and it is chiefly from pork that ordinary sausages are made. Taking this into account, it would appear that 70 per cent of water is a reasonable maximum amount of water which may be tolerated in the flesh content of sausage. The addition of cereals, up to 10 per cent, is permitted, and these usually contain no more than about 10 per cent of water. As a matter of fact, the samples (123 in number) herein reported contain decidedly less than 70 per cent of water, and the following synopsis is of interest and importance:—

Samples containing over 65 per cent water	7
" " 60 to 65 per cent water	19
" " 55 to 60 per cent water	34
" " 50 to 55 per cent water	33
" " less than 50 per cent water	30
Total	123

The great majority of samples of this collection shows less than 60 per cent water; and I am of opinion that a limit of 60 per cent water in sausage would not be unreasonable where the sausage was made from meats containing a proper proportion of fat. In the case of sausage described and sold under a name which implied the use of lean meats, a somewhat higher percentage of water might be tolerated.

It is impossible to overlook the extremely varied prices at which sausages are sold at retail. The following tabulated statement illustrates this, and at the same time gives an idea of the relation existing between actual value as a food and price per pound.

Sausages—Cost in Proportion to Nutritive Material.

Number of samples examined.	Retail price per lb. as sold.	Average water content.	Average solids.	Average cost per lb. of solid matter.	Arranged in order of low cost for equal nutriment
	cts.			cts.	
18	30	52·93	47·07	63·8	11
6	28	51·52	48·48	57·7	9
3	27	45·65	54·35	49·7	6
14	25	56·82	43·18	57·8	10
2	24	47·21	52·79	45·3	4
3	23	53·85	46·15	49·8	7
3	22	57·11	42·89	51·3	8
45	20	55·95	44·05	45·4	5
19	17	55·54	44·46	38·2	3
7	15	55·32	44·68	33·5	2
3	13	49·45	50·55	25·7	1
123					

Doubtless the high-priced sausages owe their sale in many cases to public confidence in the manufacturer, and to a claim for the use in their manufacture of selected material only. They are probably sold locally, or within restricted areas only. In some cases it may be that a special seasoning, or other individual character, may give them advantage in the market; but as regards nutritive value, the samples now reported must be judged entirely upon their content of dry material.

ADDENDUM.

22nd January, 1918

In my report, as above, it was shown that only four samples of sausages, out of a total of 123 samples, contained dyed meat. I have learned since writing this report, that the markets in which dyed sausages are chiefly sold, are quite restricted; and as the District of Montreal was not represented in the collection, I have caused a special inspection of this District to be made. The results of examination of 41 samples purchased by our inspectors in Montreal are given in Table II.

While the moisture and starch percentages found in these samples indicate nothing that requires special comment, it will be seen thaat 29 samples (forming 70 per cent of the collection) contain dyes. It is thus evident that the District of Montreal is one of the areas in which the dyeing of sausage meats is noteworthy.

In all these instances the character of the meats persent was satisfactory in the sense that these were sound and wholesome. The necessary inference is, that the demand for a coloured sausage is consequent upon conditions which may be regarded as abnormal, and more or less local. It may be that the foreign population of this city (Montreal) proportionably larger than in the country as a whole ,explains the matter. However this may be, it is quite apparent that some means of declaration of added colour must be devised and your Advisory Board will take this matter into consideration with a view to making recommendations.

A. McGILL,
Chief Analyst.

BULLETIN No. 393—SODIUM PHOSPHATE.

OTTAWA, February 27, 1918.

SIR,—I beg to hand you a report upon Sodium Phosphate, and Effervescent Sodium Phosphate.

Sodium Phosphate, otherwise known as *Sodii Phosphas* or *Di-sodium Hydrogen Phosphate,* or *Phosphate of Soda,* is one of the most widely used drugs of the pharmacopœia, and is thus described in the British Pharmacopœia, Edition 1914.

Characters and Tests. Transparent, colourless, rhombic prisms, efflorescent. Taste saline. Soluble in 7 parts of water, the solution being slightly alkaline to litmus. Yields the reactions characteristic of sodium and of phosphates. Five grammes dissolved in 50 millilitres of water require for neutralization not less than 13·9 millilitres of N/1 solution of sulphuric acid, solution of methyl orange being used as indicator. Yields no characteristic reactions for potassium, ammonium, carbonates, or chlorides, and not more than the slightest reaction for sulphates. Lead limit 5 parts per million. Arsenic limit 5 parts per million.

In the present report, this article is represented by 144 samples.

Non-effloresced crystals of sodium phosphate contain 60·33 per cent of water, and 19·83 per cent of phosphoric acid (stated as phosphoric anhydride, P_2O_5.)

The salt is highly efflorescent (i.e. loses water of crystallization in contact with air) and in consequence of this fact, its content in water is decreased and its content of phosphoric acid is proportionally augmented on prolonged keeping, unless proper

precautions are taken. Thus, the loss of 5 per cent of water would cause the phosphoric acid content to be raised to 20·5 per cent nearly; while loss of 10 per cent water would raise the phosphoric content to 21·1 per cent. By artificial drying to loss of 50 per cent of its water of crystallization, the phosphoric acid content is raised to 28·4 per cent, and it is quite apparent that many of the samples herein reported have been dessicated so as to cause the loss of even more than 50 per cent of normal water of crystallization.

In the manufacture of effervescent sodium phosphate it is necessary to dry the sodium phosphate; and the pharmacopœia prescribes drying to the loss of about 60 per cent of the weight of the salt. This treatment renders it practically anhydrous; and its phosphoric acid content would then be raised to 50 per cent by weight.

By continued exposure to the air, at ordinary temperatures, crystallized sodium phosphate is said to lose five out of its normal twelve molecules of water of crystallization. This would result in a salt containing 26·5 per cent of phosphoric acid. In all samples showing a higher percentage than 26·5, it is probable that these have been intentionally subjected to dessication, or have been for a long time kept in an abnormally dry atmosphere.

The result of dessication is to make the sodium phosphate content more than 100 per cent when calculated from the phosphoric acid found. The number thus obtained has however, a practical value; and should be known to the physician, if regard is to be had to the quantity prescribed. Thus, if a prescription calling for 100 parts of sodium phosphate is filled by a partially dried salt containing 26·5 per cent of phosphoric acid, the patient receives about one-third more of the drug than the physician directed. It will be seen, from the table, that a large number of these samples are so abnormal, that a given weight of them corresponds to much more than the same weight of sodium phosphate; in a few cases to nearly double that weight.

Sodium phosphate is prepared by the interaction of acid calcium phosphate with sodium carbonate. The acid calcium phosphate is itself prepared by treating a neutral calcium phosphate with sulphuric acid. It is well known that much of the sulphuric acid of commerce contains arsenic, derived from the raw material (pyrites) employed in its manufacture. In consequence of this fact, arsenic is frequently introduced into acid calcium phosphate, and thence into the sodium phosphate, prepared from it.

The occasional presence of notable amounts of arsenic in sodium phosphate was pointed out in 1909 (see bull. 181). Six samples of the drug were found to contain from 5 to 10 parts of arsenic per million.

The Pharmacopœia fixes the limit for arsenic at 5 parts per million, and this limit is legalized for Canada by Order in Council of October, 1912, (G. 1048). A recent report to the Local Government Board of Great Britain, by Dr. MacFadden, (1916-17) includes certain samples (about 50 in number) of acid calcium phosphate in which the arsenic was excessive, reaching as much as 400 parts per million. In one sample 643 parts per million were found. It is easily to be understood how arsenic, in considerable amount, may pass over into sodium phosphate manufactured from an acid calcium phosphate of such character.

Of 144 samples of sodium phosphate herein reported (Table I), 64 samples are found to contain no arsenic, or only negligible traces. Sixty-eight samples contain amounts not exceeding 5 parts per million, while 12 samples contain above 5 parts per million, the highest amount found being 25 parts.

Effervescent Sodium Phosphate (Sodii Phosphas Effervescens) is a mixture of sodium phosphate with sodium bi-carbonate and citric and tartaric acids. It is, in effect, a convenient mode of administering sodium phosphate; and contains about one third of its weight of this salt. The usual dose is about double that for sodium phosphate.

One hundred and sixty-nine (169) samples of this article are reported in Table II. So far as arsenic is concerned, they show as follows:—

No arsenic or traces only	74	Samples.
Less than 5 parts per million	94	"
More than 5 parts per million	1	"
	169	

It is evident, however, that these samples are chiefly made from sodium phosphate containing more or less arsenic, and the explanation of a better showing is the fact that only about one-third of the weight of the article consists of sodium phosphate.

A considerable deviation from the pharmacopœal formula is observed in many of these samples; and most of them contain decidedly more sodium phosphate than the formula demands. Two samples (7357 and 5022) are apparently merely sodium phosphate supplied by mistake. Only one sample contains arsenic in sufficient amount to call for comment.

Although none of the samples herein reported can be regarded as positively dangerous, in regard to arsenical content, it is sufficiently apparent that manufacturing chemists must test all samples of sodium phosphate for arsenic, and reject such as show more than the legal limit of 5 parts per million, if they would meet the requirements of the British Pharmacopœia. The United States Pharmacopœia fixes the limit for arsenic at 10 parts per million; and the Adulteration Act (Section 7b), recognizes this Pharmacopœia. When, however, any other standard than that set by the British Pharmacopœia is in question, we expect such authority to be quoted. Failing this, the standard of the British Pharmacopœia governs.

BULLETIN No. 394—WINES AND LIQUORS.

OTTAWA, February 12; 1918.

SIR,—I have the honour to hand you a report on 114 samples, purchased by various specific names, which may be included under the comprehensive title, Wines and Liquors.

An Order in Council of February 8, 1911 (published by this Department as Circular G. 947) defines the terms Wine, Beer, Whisky, Rum, Gin, etc., and the definitions given are consistent with the ordinary use of these terms. Recent legislation in several provinces of Canada has restricted or forbidden the sale of alcoholic liquors of the kinds referred to; and interested parties have, in some instances, placed on the market would-be substitutes for these, and have not hesitated to adopt the terms wine, beer, rum, etc., in describing such substitutes.

In consequence of such action, complaint has been made by purveyors of alcoholic liquors, and also by purchasers, who have been duped into buying wine which is not wine; whisky, which is not whisky, etc. Under the Order in Council above referred to, *Whisky, Brandy* and *Rum* are required to contain not less than 42.75 per cent (volume) of absolute alcohol, equivalent to 75 per cent by volume of proof spirit. *Gin* must contain not less than 37 per cent of absolute alcohol, equivalent to 65 per cent proof spirit.

Although a limit for alcohol is not fixed in the case of Wine, this article is defined as "the product of the normal alcoholic fermentation of the juice of sound ripe grapes, etc." Alcohol is therefore a normal constituent of Wine; and actual wines show amounts varying from about 10 to over 30 per cent of proof spirit.

It was in order to ascertain the facts of the case that our inspectors were instructed, in June of last year, to investigate the matter; and the results of their investigation are herewith furnished to you.

So far as the name under which the article is sold is concerned, the samples may be classified as follows:—

Sold as Whisky	10	samples.
" Rum	10	"
" Gin	14	"
" Wine	45	"
Alcohol	1	"

Sold as Brandy	12	samples.
" Medicated Wine	3	"
" Cordials, etc	11	"
" Beer or Porter	3	"
Total	114	

Fifty-three (53) samples are found to be true to name under which sold, and to meet legal standards for such article; thirteen (13) may be regarded as meeting the type, but are below standard requirements in one or other respect.

Thirty-nine (39) samples are clearly fraudulent, in the sense of claiming to be what they are not; while nine (9) samples I have judged as doubtful, in the absence of a standard for the term *Cordial,* under which name, or an apparent equivalent, these samples are sold.

Details are given below:—

LIQUORS which are below legal strength in alcohol (proof spirit).

	Number.	Sold as.	Proof Spirit strength.	Deficiency.	Opinion.
1	76676	Rum	71·05	3·95	Pass.
2	71075	Cognac	55·95	19·05	Adulterated
3	71081	Cognac	45·08	29·92	"
4	71084	Rum	50·74	24·26	"
5	73898	Brandy	57·09	17·91	"
6	77881	Port wine (unfermented)	12·97	.....	"
7	68439	Whisky	69·99	5·01	Pass.
8	75832	Gin	61·32	3·68	"
9	75839	Gin	60·29	4·71	"
10	75841	Brandy	72·20	2·80	"
11	75936	Gin	48·70	16·30	Adulterated
12	75940	Gin	58·14	6·86	"
13	75941	Brandy	64·10	10·90	"

The Order in Council fixing limiting percentages for proof-spirit strength, provides that liquors having a spirit strength below the standard may be legally sold "when the actual percentage is legibly and distinctly marked on each and every package, parcel, bottle, or other container of such spirits."

In none of the cases above referred to is this condition fulfilled. I would, however, respectfully suggest that proceedings be not taken in cases where the deficiency does not exceed five (5) per cent. This is in accordance with usual procedure; but must be regarded as an act of clemency, and not as establishing a binding precedent.

The following samples are sold as *Cordials,* or by a name which may be regarded as equivalent to this:—

	Number.	Sold as.	Spirit strength.	Sugars.	Opinion.
1	72578	Mint Cordial	1·86	14·07	Doubtful.
2	72579	Pineola	1·39	17·39	"
3	72580	Orange	1·74	17·01	"
4	72581	Black Cherry	1·39	22·81	"
5	77912	Creme de menthe	1·86	35·81	"
6	77913	" "	none.	34·07	"
7	77993	Anisette	3·44	40·80	"
8	77995	Tipperary Punch	none.	14·10	"
9	78000	Creme de menthe	0·12	27·53	"

A cordial is generally understood to be an aromatized and sweetened spirit, used as a beverage, a liqueur, and is so defined by Webster. This authority furnishes an

alternative définition; "Any invigorating and stimulating preparation, as a medicine, food or drink; as a peppermint cordial."

In the absence of any legally established definition of the term, I am unable to express a clear opinion as to the genuineness or otherwise of these articles. I am, however, convinced that such names as "Crême de Menthe" are generally understood to imply the presence of alcohol; and the sale of a non-alcoholic liquor under such a name should be regarded as adulteration.

Thirty-nine (39) samples are sold under names which are legally defined, and all of these samples are adulterated, in the sense that they are not what they claim to be.

Wines.—Wine is the product of the normal alcoholic fermentation of the juice of the grape. Twenty-seven (27) samples are sold as Wines; and these are not fermented; nor are they, in any case, products of the normal alcoholic fermentation of grape juice.

Gin.—Is a product of the distillation of alcohol from juniper berries, and should contain, along with the volatile oil of juniper, at least 65 per cent of proof spirit. Four (4) samples are sold as gin which fail to meet these requirements.

Brandy.—Is a product of the distillation of wine, and should contain at least 75 per cent of proof spirit. Three (3) samples are sold as brandy which fail to meet these requirements.

Porter.—Is required to possess a spirit strength of at least 6 per cent. Two (2) samples sold as porter contain less than 2 per cent.

One sample sold as *Whiskey*, one as *Rum*, and one as *Lager Beer*, fail to meet standard requirements for these beverages.

Doubtless these articles are manufactured and sold with intent to meet the requirements of provincial temperance legislation. They must, however, be compelled to bear properly descriptive names; otherwise they are adulterated under section 3 (*d*) of the Act.

All of these samples are technically adulterated. Whether or not it will be well to inflict penalty in these cases, I leave you to decide. I have expressed the opinion that they are not what they claim to be; and the above-quoted section of the Adulteration Act applies.

I would respectfully draw your attention to the fact, which becomes more and more evident as my correspondence increases, that in the majority of cases the manufacturers are meeting exceptional conditions to the best of their ability, and without any intention of violating the provisions of the Act.

Recent provincial temperance legislation has interfered with the legitimate business in alcoholic beverages, and it is not a matter of surprise that manufacturers should attempt to meet existing conditions.

Until our Act distinguishes between "misbranding" and "adulteration" I think it will be only fair to these people that the Department should exercise leniency in interpretation, and I would respectfully suggest that in all cases of technical adulteration of the kind referred to, no legal action be taken.

BULLETIN No. 395—CANNED CORN.

OTTAWA, 9th March, 1918.

SIR,—I beg to hand you a report upon the examination of 207 samples purchased by our inspectors as Canned Corn in August, September and October of last year.

The samples in question apparently represent 61 different brands, as ascertained by inspection of the labels. It is, of course, possible that several of these brands may be the product of a single factory, and may differ from each other only in name.

While samples of every brand found on the market have been examined it has not been considered necessary to work every sample, in cases where a large number of samples of the same brand have been supplied. The total number of samples upon which work has been done is 168.

This food material has been inspected on two former occasions. Bulletin No. 226 (July 1911) reports upon 146 samples and bulletin No. 285 (April 1914) upon 205 samples. With a single exception, the net contents of the cans closely approximate 20 ounces in the present collection; and the same is true of former collections. As regards the weight of solid matter, there is a somewhat more marked variation, and the following table shows the average results obtained, with the samples upon which work was done:

Name of Brand.	Samples Collected.	Samples Worked.	Mean Results as to Contents. (ounces).		
			Total.	Solids.	Liquid.
Bloomfield	1	1	20·6	17·4	3·2
British Canadian	3	3	20·7	17·0	3·7
Burford	2	2	20·2	19·5	0·7
Canada First	9	8	20·4	17·4	3·0
Colonist	2	2	19·6	16·9	2·7
Cresca	1	1	20·1	17·5	2·6
Crusader	6	3	18·7	14·3	4·4
Dreadnought	1	1	21·4	20·5	0·9
E. D. S	4	3	20·5	17·7	2·8
Egyptian	1	1	20·2	15·3	4·9
Essex	3	3	20·5	18·3	2·2
Excelsior	2	2	19·7	18·2	1·5
Faultless	1	1	20·8	20·8	0·0
First Pick	2	2	20·0	14·1	5·9
Fleur de lis	6	6	19·9	17·5	2·4
Frankford	2	2	20·1	18·2	1·9
Frontenac	1	1	20·6	18·0	2·6
Gazelle	4	3	20·1	16·1	4·0
Gold Bond	1	1	20·2	18·8	1·4
Gold Standard	3	3	20·4	18·2	2·2
Grand River	1	1	20·6	17·5	3·1
Harvest	1	1	20·1	17·0	3·1
Honeydrop	1	1	20·4	20·4	0·0
Horseshoe	3	3	20·2	19·0	1·2
Hygeian	7	7	20·0	18·2	1·8
Ice Castle	13	9	20·1	18·5	1·6
Lanceboro	1	1	21·3	19·3	2·0
Lennox	1	1	21·0	20·7	0·3
Lion	13	8	20·4	16·6	3·8
Little Chief	22	9	20·5	17·4	3·1
Log Cabin	3	3	20·6	18·9	1·7
Lynn Valley	12	7	20·4	16·2	4·2
Malkin's Best	1	1	21·0	14·3	6·7
Maple Leaf	7	4	20·5	17·3	3·2
Mountain Crest	3	3	19·9	15·2	4·7
Mount Yoe	2	2	19·5	18·3	1·2
No Vary	4	4	20·2	18·9	1·3
Old Homestead	5	5	20·2	17·2	3·0
Old Oak	1	1	20·3	15·5	4·8
Parliament	3	3	20·0	17·6	2·4
Peacock	1	1	20·0	18·9	1·1
Peerless	1	1	20·4	20·0	0·4
Poland	1	1	19·6	14·5	5·1
Pride of N. Falls	2	2	20·2	17·4	2·8
Primus	1	1	19·2	18·0	1·2
Pure Food	1	1	20·1	17·2	2·9
Puritan	1	1	17·5	12·2	5·3
Quaker	10	10	20·1	17·1	3·0
Red Seal	1	1	20·8	18·7	2·1
Sportsman	1	1	20·3	16·3	4·0
Sugar Corn	1	1	20·7	17·2	3·5
Swiss Bell	1	1	19·9	15·9	4·0
Tartan	2	2	20·3	16·2	4·1
Thames	2	2	20·9	19·7	1·2
Thistle	13	11	20·0	16·7	3·3
Victoria	2	2	20·5	15·4	5·1
Victory	1	1	20·3	14·4	5·9
Vine	2	2	20·7	19·7	1·0
Vulcan	2	2	19·3	15·2	4·1
White Rose	1	1	21·2	11·6	9·6
Wiley	1	1	20·4	19·9	0·5

It will be noted that, with few exceptions, the solid contents approximate 18 ounces, and this may be regarded as a normal amount. With one or two exceptions, the contents have been found to be in good condition. Only traces of sulphurous acid or sulphites are reported. This does not necessarily mean that bleaching with sulphites has not been done. Sulphurous acid is easily oxidized to sulphuric acid, and thus may not appear after the sample has been kept for some time. It is, however, quite apparent that this bleaching agent has been employed more sparingly than formerly, and it is to be hoped that its use will soon become a thing of the past. In 1911, 46 samples gave decided amounts of sulphites. In 1914 the number was much reduced; and the present report indicates a continued lessening of the amount employed, and in many cases, its entire absence.

The use of saccharin, as a sweetener, has likewise been discontinued.

BULLETIN No. 396—SALAD OIL.

OTTAWA, March 11, 1918.

SIR,—I beg to hand you a report upon 149 samples purchased as Salad Oil during the months August to November 1917.

Olive Oil has been employed as a food from very early times; and as far as I can learn, was the only vegetable oil used in English speaking countries, as a component of Salads, until comparatively recent years. In consequence of this fact, purchasers of Salad Oil, unless specially instructed by a label, or otherwise, assumed that they were getting Olive Oil.

Many other vegetable oils have been found to be eligible, for food purposes; and extended investigation has proved them to be, both as regards digestibility and energy value, practically equal to Olive Oil. Most of these, however, possess in their natural, or untreated condition more or less distinctive and characteristic flavours, which, while they may not be in the strict sense, objectionable, are only tolerated by usage, and on acquired taste, and are sufficiently obvious to make the substitution of these oils for Olive Oil, impracticable.

By skilful treatment, however, it has been found possible to remove these specific flavours, and thus to produce a bland oil, capable of being mixed with olive oil, or entirely replacing olive oil, without detection, except by discriminating palates. So far as Canada and the United States are concerned, Cotton Seed Oil has been very largely employed in this way, and of course, has been regarded as an adulterant, when substituted for Olive Oil without declaration of its presence.

In view of the natural desire of the manufacturer to find a market for new, and little known materials, it is perhaps not cause for wonder that the public should be left to find out for itself the facts of the case. Thus, substitutes for lard, made from tallow and various oils, were for a long time offered as Lard; mixtures of cane sugar with highly flavoured specimens of maple sugar, were offered as Maple Sugar; glucose syrup (corn syrup) posed as Honey; Milk, from which the fat had been removed by a machine, instead of by hand, as in the older fashion, is offered as separated instead of skimmed milk, etc. The list might be made a very long one. In none of these cases was any injury done to the health of the consumer; and in the long run, the truth of the matter was discovered and made public. It is, however, very regrettable, that any good food material should seek to pose for other than what it really is.

A great number of vegetable oils are capable of being refined in such a way as to become available for use as Salad Oils; and the following list was submitted to the Association of Official Agricultural Chemists, in Washington, D.C., in November, 1916.

Fats and Oils.

Edible fats and edible oils are such glycerids of fatty acids as are recognized to be wholesome foods. They are dry and sweet in flavor and odor.

Cacao butter, coca butter is the edible fat obtained from sound cacao beans either before or after roasting.

Coconut oil, copra oil is the edible oil obtained from the kernels of the coconut.

Cochin oil is coconut oil prepared in Cochin (Malabar).

Ceylon oil, is coconut oil prepared in Ceylon.

Corn oil, maize oil is the edible oil obtained from the germ of Indian corn (maize) (Zea mays L.)

Cotton seed oil is the edible oil obtained from the seed of the cotton plant (Gosspyium herbaceum, L. or other species of Gosspyium).

Olive Oil, sweet oil is the edible oil obtained from the sound, mature fruit of the olive tree (Olea europaea L.).

Palm kernel oil is the edible oil obtained from the kernels of the fruit of the palm tree (Eloeis guineensis L.).

Peanut oil, arachis oil, earthnut oil is the edible oil obtained from the peanut (Arachis hypogaea L.).

Poppy seed oil is the edible oil obtained from the seeds of the poppy (Papaver somniferum L.).

Rape seed oil, colza oil is the edible oil obtained from the seeds of the rape plant (Brassica compestris).

Soy bean oil, soja oil is the soluble oil obtained from the seeds of the soy bean plant (Dolichos soja L., Soja, Hispida, Sieb et Zucc., Soga japonica, Savilk, Blycine hispida, Maxim, Glycine Soja L.).

Sesame oil, gingili oil, teel oil, benne oil is the edible oil obtained from the seed of the sesame plant (Seseamum indicum, De Candolle L., Radiatum Schum and Thonn).

Sunflower oil is the edible oil obtained from the seeds of the sunflower. (Helianthus annuus L.).

In order, however, to secure proper protection to the producer as well as to the consumer, it is necessary to require that when any of the oils named seek a market as *Salad oils,* the specific name of the oil should appear on the label. Our own standards for edible vegetable oils (published as Circ. G. 1002) require that when Cotton Seed Oil is sold as Salad Oil, the fact that the article is cotton seed oil must be declared on the label. The regulation referred to should be amended to include available oils other than cotton seed oil. At the time these standards were promulgated, Cotton Seed oil was the only substitute for Olive Oil found on our markets. One sample of Peanut oil is included in the present collection. (No. 80420).

While the above named vegetable oils are recognized as possessing a food value practically equivalent to that of Olive Oil, and consequently as permissible substitutes for olive oil when properly described on the label, it is quite otherwise with mineral oils. These are indigestible and have no food value whatever. Certain liquid paraffins, carefully purified, possess value as drugs, and *Paraffinum Liquidum* is recognized by the Pharmacopoeia. But as foods they are without any value.

Thirty-one (31) samples of the present collection while sold as Cotton Seed Oil, are found to contain paraffin (mineral) oils in amounts varying from 3 to above 30 per cent.

Less than 10 per cent. mineral oil	4	samples.
Between 10 and 20 per cent. mineral oil	7	"
Between 20 and 30 per cent. mineral oil	13	"
More than 30 p c. mineral oil	7	"
Total	31	

These samples are sold without any declaration of the presence of mineral oil, and must be regarded as adulterated under the Act; which defines food as adulterated "if any substance has been mixed with it, so as to reduce or lower or injuriously affect its quality or strength" Section 3, (*a*).

The results of this examination may be thus summarized:—

SALAD OIL.

Samples found to be olive oil	86	genuine.
" " cotton seed oil, and so named on label	25	"
Samples found to be cotton seed oil but not declared as such	1	adulterated.
Samples found to be cotton seed oil but sold as olive oil	1	"
Samples found to be cotton seed oil and olive oil mixed, declared	1	genuine.
Samples found to be cotton seed oil with added mineral oil	31	adulterated.
Samples found to be peanut oil	1	pass.
Samples collected by mistake	3	
Total	149	

REPORT

OF THE

MINISTER OF AGRICULTURE

FOR THE

DOMINION OF CANADA

FOR THE

YEAR ENDING MARCH 31, 1918

PRINTED BY ORDER OF PARLIAMENT.

OTTAWA
J. DE LABROQUERIE TACHÉ,
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1918

[No. 15—1919.]

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REPORT

OF THE

MINISTER OF AGRICULTURE

1917-18

To His Excellency the Duke of Devonshire, K.G., P.C., G.C.M.G., G.C.V.O., etc., etc., Governor General and Commander in Chief of the Dominion of Canada.

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to submit to Your Excellency a report of the Department of Agriculture for the fiscal year ended March 31, 1918.

I. GENERAL REMARKS.

The work of the department has been carried on efficiently, and a synopsis of the operations of the various branches comprised therein is laid before Your Excellency under their respective headings.

The legislation affecting the department during this period consisted of:—

Chapter 32, 7-8 George V, intituled "An Act respecting Live Stock." (Assented to September 20, 1917.)

Chapter 33, 7-8 George V, intituled "An Act to amend The Meat and Canned Foods Act." (Assented to September 20, 1917.)

MIGRATORY BIRDS CONVENTION ACT.

On August 29, 1917, assent was given to the Migratory Birds Convention Act. This Act puts into effect the Migratory Birds Convention between Great Britain and the United States of America for the protection of migratory birds in Canada and the United States, which convention was ratified on December 7, 1916. The negotiations in the interests of the Canadian Government were undertaken by the Department of Agriculture, the Department of the Interior, and the Commission of Conservation co-operating. As the administration of game legislation, so far as the Dominion Government is concerned, comes under the jurisdiction of the Department of the Interior, the latter department has been given the administration of the Act under

the general supervision of the Advisory Board on Wild Life Protection, upon which board the Department of Agriculture is represented.

Regulations have now been drafted by the Advisory Board, and it is expected that they will shortly be put into effect.

Under the convention the permanent protection of migratory insectivorous birds is provided for, and as these birds constitute one of the most important natural factors tending to prevent the increase of the insect pests of our crops and forests the enactment of this legislation is of considerable importance to the agricultural and forestry interests of Canada.

By an Order in Council, approved under date the 16th day of April, 1917, the Regulations relating to Tuberculosis, approved under date the 18th May, 1914, were rescinded and new Regulations substituted in lieu thereof.—*Vide Canada Gazette,* vol. L, p. 3664.

By an Order in Council, approved under date the 15th day of May, 1917, the General Regulations under the "Destructive Insect and Pest Act," approved under date the 4th November, 1914, and amendments thereto, were further amended by adding to Regulation X, Part (*a*) Insects and Pests, the following:—

"The Apple and Cherry Ermine Moths (*Yponomeuta malinellus* and *Yponomeuta padellus*)."

Vide Canada Gazette, vol. L, p. 4062.

By an Order in Council, approved under date the 17th day of July, 1917, the General Regulations under the Destructive Insect and Pest Act, established under date the 4th November, 1914, and amendments thereto, were repealed and new Regulations established in lieu thereof.—*Vide Canada Gazette;* vol. LI, p. 264.

By an Order in Council, approved under date the 23rd day of October, 1917, the Order in Council of date the 8th February, 1915, respecting the payment of fees for obtaining the grant or obtaining the renewal of patents or for obtaining the registration of designs or trade marks or the renewal of such registration in an "enemy country" was revoked, and authority given to grant license to all persons resident, carrying on business, or being in the Dominion of Canada, being of British, Allied, or Neutral nationality.—*Vide Extra Canada Gazette,* November 5, 1917.

By an Order in Council, approved under date the 30th day of January, 1918, the Regulations established under "The Animal Contagious Diseases Act" of date 30th November, 1909, and amendments thereto, were further amended by rescinding section 42 and substituting a new section in lieu thereof.—*Vide Canada Gazette,* vol. LI, p. 2696.

By an Order in Council approved under date the 4th day of February, 1918, the following Regulations were made and enacted in virtue of the provisions of The War Measures Act, 1914, to enable an enquiry to be made in Canada with respect to the supply of seeds, fertilizers, and other agricultural supplies available and needed for the coming season:—

REGULATIONS.

1. The Minister of Agriculture shall have power from time to time to make such enquiries and investigations as he deems necessary to ascertain any particulars that he may deem advisable with respect to the demand for, the supply, the use, manufacture, preparation, location, ownership, sources of supply and

prices of seed, fertilizers, and of any other article required in connection with the production or raising of agricultural produce or of any article required in connection with the manufacture, transportation or marketing thereof, and to make such regulations as he may deem necessary for securing any information that he may require in connection with the same; and may also require any person and any officer or employee of any corporation, association or syndicate to answer correctly, to the best of his knowledge, under oath or otherwise, and within such time as the Minister may prescribe, all questions touching his knowledge of any matter to be investigated hereunder, to produce to the Minister or to any officer by the Minister thereto authorized, all books, letters, papers, or documents in his possession or under his control relating to such matter, and to permit the Minister or such officer as aforesaid to enter at any reasonable times any premises for any purpose connected with any enquiry or investigation hereby authorized.

2. Any person who shall in any way impede or obstruct the Minister of Agriculture or any officer thereto authorized by the Minister in obtaining any information or entering any premises as aforesaid, or shall neglect or refuse to supply any information or to produce any books, letters, papers or documents in his possession or control that the Minister of Agriculture or any officer by him thereto authorized may require or shall wilfully make any false statement shall be guilty of an offence and shall be liable on summary conviction to a penalty not exceeding one thousand dollars or to imprisonment for a term not exceeding one year, or to both fine and imprisonment.

By an Order in Council, approved under date the 11th day of February, 1918, subsection B of section 7 of the General Regulations under "The Destructive Insect and Pest Act." approved under date the 17th day of July, 1917, respecting the importation of pineapples and bananas from Hawaii, was amended.—*Vide Canada Gazette,* vol. L, p. 2855.

By an Order in Council, approved under date the 20th day of February, 1918, the Regulations respecting Patents of Invention, established by Order in Council of date the 2nd October, 1914, under and by virtue of the provisions of the War Measures Act, 1914, were further amended by adding regulation, numbered 11, at the end thereof.—*Vide Extra Canada Gazette,* February 26, 1918.

By an Order in Council, approved under date the 8th day of March, 1918, the Regulations respecting Patents of Invention, established by Order in Council of date the 2nd October, 1914, under and by virtue of the provisions of The War Measures Act, 1914, were further amended by adding thereto the following regulation, numbered 12:—

"12. Any person to whom a license is granted to make, use, exercise or vend a patented invention under the provisions of regulation three, shall have the same power and right to take any action or other legal proceedings to prevent or restrain any infringement of the said patent which affects the rights of such person under such license, or to recover compensation or damages for any such infringement, that the owner of a patent would have for an infringement of his patent."

As there were no large international exhibitions in view when the Panama-California International Exposition held in San Diego, California, during 1916 and also up to March 31, 1917, was over, the Canadian exhibits shown thereat were packed and transported to Ottawa, where they are stored for the present.

A report from the Canadian Exhibition Commissioner for the fiscal year ended March 31, 1918, will be found as an appendix hereto. (See appendix No. 2.)

II. ARTS AND AGRICULTURE.

DAIRY AND COLD STORAGE BRANCH.

The season of 1917 was a notable one in the history of the dairying industry, prices for all products having reached the highest level on record. The total production shows an increase over 1916, with a small decrease in butter but a large increase in condensed milk and milk powder, the output of these two latter products having increased over 100 per cent. The Cheese Commission reports that the exports of cheese will be over 174,000,000 pounds for the crop of 1917, or some 6,000,000 pounds less than for 1916, but on the other hand home consumption has shown a very considerable increase. It is calculated that the total production of cheese in 1917 was about 200,000,000 pounds, having a value of $43,500,000. The value of all dairy products in 1917 is estimated to be approximately $200,000,000.

THE CHEESE COMMISSION.

In March, 1917, the Imperial Board of Trade expressed a desire to purchase the exportable surplus of Canadian cheese for the season of 1917. Mr. Jas. McGowan was sent out as a representative of the Board, and the Canadian Government named Mr. Jas. Alexander, Montreal, and Mr. J. A. Ruddick, Dairy and Cold Storage Commissioner, as the Canadian members of the commission. After negotiations the Board of Trade finally authorized the commission to pay 21¾ cents f.o.b. steamer for the season's output. The commission established an office in Montreal, and organized the necessary staff to carry on the business.

SCARCITY OF RENNET.

I am informed that the supply of rennet continues to be far short of the requirements of the cheese manufacturers, and that pepsin in various forms is still being used as a substitute. The experts of the department have watched the matter very carefully, and they report that the use of pepsin has not affected the high quality of the Canadian cheese. A close check is also kept on the character of the various preparations of pepsin, which are being offered to the cheesemakers, to see that nothing inferior is put on the market.

DAIRY STATION AT FINCH, ONT.

The dairy station was operated by the Dairy Branch during the entire year as usual. The gross value of the milk received for the calendar year 1917 was $61,289.35, an increase of $17,049.19 over 1916. The output of the station is changing somewhat year by year, less cheese being made and more milk and cream being sold. The sales of milk in 1917 exceeded those of 1916 by 242,769 pounds. Sales of cream increased by 7,401 pounds of butter fat. The average net price paid the patrons per hundred pounds of milk for the year was $2 delivered at the factory, which was 40 cents per hundred more than was paid in 1916. The high price received for milk shipped to the cities of Montreal and Ottawa during the winter months is encouraging greater production during that season of the year.

The Madawaska creamery at St. Hilaire, N.B., was again operated by the department during the summer months. There was a slight increase in the output of the creamery over 1916, the total value of the output being $18,320.71. The average price paid to the patrons per pound of butter fat was 44.82 cents. In 1916 the average price paid for butter fat was 35.55 cents. The farmers in the district are becoming interested in the improvement of their dairy herds. A number of pure bred dairy sires have been brought into the district and, although improvement is somewhat slow, the increase in dairy products in this district should be considerable in the course of a few years.

COW TESTING.

The officers in charge report that during the year 1917, herd record work, commonly known as cow testing, was continued on the same general lines as in former years, through cow testing associations and the 35 dairy record centres. There were 29,240 cows in 3,421 herds under test, with a total number of 205,156 individual monthly records. The demand for milk record forms from dairymen in all parts of the Dominion, who keep private records but do not send any figures to the department, has been larger than ever before.

As in former years, the herd records indicate very substantial increases in the yield of milk and fat per cow since cow testing was commenced. It appears that the average yield of milk per cow for all Canada has increased fully 30 per cent since the work was first started. This means that the total value of Canadian dairy products was greater by at least $50,000,000 in 1917 than it would have been if there had been no improvement or increase in the herds since 1904. The increase in the yield of milk from individual herds has been much more striking because the general average includes all those herds whose production of milk has remained stationary, or nearly so.

The results already obtained have awakened such a widespread interest in cow testing, and the requests for help are so insistent, that some reorganization of the work which will cover every dairying district in the Dominion seems to be advisable. A new plan has been arranged, under which it is proposed to discontinue the record centres and to enlist the services of cheesemakers and buttermakers or other qualified persons to do the testing at the rate of 10 cents per test, the milk testers to provide their own equipment. The cheese factories and creameries are natural centres for

such work. In order to carry on herd record work in any district under the new arrangement, it will only be necessary for the farmers to co-operate with some qualified milk tester by weighing and sampling each cow's milk night and morning, on three days of every month, and by delivering the samples at the appointed place of testing.

INSPECTION OF DAIRY PRODUCTS.

The work in this division has been increased considerably by the introduction of oleomargarine. The inspectors employed to administer the Dairy Industry Act are charged with the duty of watching the retail sale of oleomargarine. Speaking generally, the dairy laws of Canada are well observed. The chief offense seems to be that of allowing an excess of water to remain in butter offered for sale. A number of prosecutions have been made during the year on this acccount.

REFRIGERATOR CAR SERVICES FOR BUTTER AND CHEESE.

The special refrigerator car services for butter were in operation from May 14 to October 6, covering the dairy sections of Ontario, Quebec, and Nova Scotia. The department guaranteed earnings of a certain sum per car for a regular weekly refrigerater service by which shippers were enabled to forward any quantity of butter from one package upwards without any additional cost other than the regular less-than-carload freight rate. About 1,300 cars were operated in this service at a total cost to the department of approximately $10,500.

The usual inspection was maintained by the department at the railway terminals at Montreal, Toronto, and Halifax, and the operation of the service as a whole was carefully supervised. The inspectors reported daily regarding the condition of the cars on arrival, giving the temperature of the butter, the quantity of ice remaining in the bunkers, the stowage of the packages, etc. With a few exceptions a good service was maintained on each route.

For the carriage of cheese the department paid the icing charges at the rate of $6 per car on about 1,400 carloads shipped between June 11 and September 8. The arrangement applied to shipments in carloads, minimum 24,000 pounds, on cheese consigned to Montreal for local delivery and for export, also in less than carload quantities when shipped in one car by one or more consignee from one station, when the aggregate weight of the shipment was not less than 24,000 pounds. At least two tons of ice had to be supplied to each car by the railway companies.

Under the regulations of the Cheese Commission, all cheese intended for export had to be shipped to Montreal, and in order that the cheesemaking industry in the province of Prince Edward Island should not be at a disadvantage the department agreed to pay the icing charges on carload shipments between Point du Chene, N.B., and Montreal, on carloads of cheese originating in Prince Edward Island. All cheese from that province were moved to Montreal by rail, and, as a result of the arrangement referred to, were delivered in first class condition.

CARGO INSPECTION.

During the season of navigation four cargo inspectors, instead of six as in pre-war days, were employed at Montreal, and one inspector at Halifax. In Great

Britain the usual staff of four inspectors was maintained, covering the ports of London, Liverpool, Glasgow, and Bristol.

Wherever possible thermographs were placed in the ships at Montreal along with perishable cargo, but not so many records were obtained as usual owing to the transient character of many of the steamers in the service.

Special reports were made by the inspectors at the ports in Great Britain on the condition of the fibre cheese boxes shipped from Canada. This is a new style of package, made from wood pulp, which was used to a considerable extent during the past season, and copies of the inspectors' reports were furnished to the Cheese Commission, to the box manufacturer, and to other interested parties.

GRIMSBY PRECOOLING AND EXPERIMENTAL FRUIT STORAGE WAREHOUSE..

During the season of 1917 experimental and demonstration work was suspended owing to the fact that the scientific staff have all enlisted. Operations were confined to the commercial handling of fruit Records have been kept and reports collected throughout the season, which give considerable information on the subject. Some excellent results have been obtained in shipping precooled sour cherries to Winnipeg by refrigerated express. Increased use was made of the plant for storage by the canning factories and by growers in accumulating carloads of fruit; the quantity handled in this way showing an increase of 350 per cent over 1916.

SUBSIDIZED COLD STORAGE WAREHOUSES.

Thirty-three warehouses, with a capacity of four and one-quarter million cubic feet of refrigerated space, have been subsidized under the Cold Storage Act (chapter 6, 6-7 Edward VII). The total cost of these warehouses was $2,300,354.85.

The subsidies represent 30 per cent of the cost of the warehouses, and the total amount paid to date is $671,690.53. The payments during the last year were $7,787.21. There are four warehouses on which small payments of the subsidy are not yet due, and three warehouses where part of the subsidy has been withheld. A new warehouse is now under construction at Saskatoon, Sask. This warehouse was started in 1914, but, owing to the financial situation resulting from the war, the construction was not completed. The contract has been renewed and the warehouse is now being built by the Saskatchewan Co-operative Creameries, Limited.

CREAMERY COLD STORAGE.

The bonus system of paying $100 to creameries which build cold storages according to plans supplied by this department has resulted in exceptionally good ice facilities being installed in a great many creameries which must necessarily carry butter for short periods.

During the past year thirty-eight creameries received the bonus of $100, while eleven applications were rejected or held for future consideration. The number of creameries bonused since 1897, when the policy was first adopted, is 1,015, with a total expenditure of $92,675.25.

SMALL COLD STORAGES.

A great many inquiries are received by letter regarding the construction of creamery cold storages and small storages suitable for farm and country homes. Plans and specifications are incorporated in bulletins, and these, along with blue-prints on a working scale, are sent to applicants from all parts of the Dominion.

PUBLICATIONS.

The following publications in the Dairy and Cold Storage Series have been issued during the year:—

Bulletin No. 53, entitled, "Buttermaking on the Farm."

Circular No. 22, entitled, "The Manufacture of Cottage and Buttermilk Cheese."

Circular No. 23, entitled, "The Manufacture of Buttermilk from Skimmed Milk."

Circular No. 24, entitled, "A New Plan for Cow Testing."

THE SEED COMMISSIONER'S BRANCH.

The work of the Seed Commissioner's Branch has continued under four divisions, seed production, seed testing, seed inspection, and seed supply.

Moneys expended to support provincial governments in encouraging the production and selection of superior seeds have given excellent results. The advisability of continuing with this work has been under consideration in correspondence with provincial Departments of Agriculture, which have agreed to the application of further restrictive regulations to encourage the production of the best varieties of uniform quality, and discourage the production of those varieties of crops which tend to detract from the value of Canadian grain and other farm produce when blended together for commerce.

Seed production under wartime conditions has required special attention and greatly increased activities in the matter of field, root and garden seeds, practically all of which were formerly imported from Europe. Efforts made to secure an increase in the amount grown have met with success and will be continued.

Seed testing work has continued at Ottawa and Calgary seed laboratories without material change as compared with former years. The seed laboratory at Ottawa was established in 1902, and at Calgary in 1906, in both of which the work has tended to increase each year about ten per cent over that of the previous year. Because of the volume of the work which has to be done promptly and during a comparatively short period of the year, it has become necessary to establish an additional seed laboratory. The work of seed laboratories in Canada, as in other countries, forms the basis of control over the sale of agricultural seeds. Before the laboratories were established farm and garden seeds of inferior quality were freely offered in Canadian markets largely because they could not be sold in other countries which had systems of seed control.

Seed inspection in Canada includes the administration of the Seed Control Act and regulations made thereunder. This service to agriculture was started in

1905 and gradually extended until the commencement of the war, when the staff was decreased by enlistments. The fewer permanent and temporary seed inspectors employed have been expected to supervise larger areas than formerly.

Seed supply has formed a problem of first importance during the past year. Wartime values of all kinds of seed have rendered it much more difficult than usual for seedsmen to perform their normal functions in meeting to the full the requirements of Canadian farmers and gardeners. In addition very considerable areas in both the west and the east of Canada have been in need of extensive supplies of seed of the food grains because of partial crop failure due to unusual climatic conditions. The services of the Seed Purchasing Commission, which was established last year, have therefore been continued and enlarged. The object was to guard against possible seed shortage by purchasing and holding in store in Canadian Government Elevators supplies of good seed of food grains. Its operations have been carried on in co-operation with the established seed trade, and all of the grains are purchased for seed subject to inspection as to definite standards of quality. Selling prices are calculated to cover the cost of the recleaned seed, and appropriations for purchase are promptly returned to the Receiver General.

It has been necessary this year to enlarge upon the annual survey made in all parts of Canada to ascertain the extent of seed shortage for any kind of crop, and acting in co-operation and concurrently with the Bureau of Markets of the United States Department of Agriculture, a definite survey has been made and information secured showing the amount of seed supplies held in reserve by seed merchants. It is satisfactory to report that no prospective seed shortage was indicated for any of the important crops, and the publication of this information provided much needed assurance to all concerned.

SEED GROWING.

Financial assistance to the provincial Departments of Agriculture and other organizations has been continued for encouraging the production of superior seed crops. Special attention has been paid to those kinds of seeds which are difficult to secure in Canada owing to war conditions.

Subventions to the provincial Departments of Agriculture for field crop competitions, local seed fairs, and provincial seed exhibitions, have been continued on the basis of two-thirds of the money awarded in cash prizes within certain limitations.

FIELD-CROP COMPETITIONS.

The following statement shows the number of field-crop competitions in the various provinces during the summer of 1917, and the amount of subvention paid to the provincial Departments of Agriculture:—

	Number.	Subvention Paid.
Prince Edward Island	9	$ 671 33
Nova Scotia, Grain Crops	13	937 46
Turnip	4	200 00
New Brunswick	10	864 00
Quebec	71	3,850 00
Ontario, Grain Crops	185	12,896 84
Vegetable crops	12	700 00
Manitoba	9	289 32
Saskatchewan	18	2,032 98
Alberta	14	2,572 63
British Columbia	45	1,200 00
	390	$26,214 56

The total amount of subvention claimed for field crop competitions was about $425 more than in the previous season.

LOCAL SEED FAIRS.

Local seed fairs were conducted during the winter 1916-17 and subvention paid as follows:—

	Number.	Subvention Paid.
Prince Edward Island	3	122 00
Nova Scotia	6	267 40
New Brunswick	6	300 00
Quebec	51	2,428 56
Manitoba	27	900 99
Saskatchewan	44	1,416 14
Alberta	35	1,355 60
British Columbia	4	300 00
	176	$7,090 69

The subvention paid on account of local seed fairs was slightly over the amount claimed during the previous season.

PROVINCIAL SEED EXHIBITIONS.

Provincial seed exhibitions were conducted during the winter of 1916-17 and subventions paid as follows:—

Prince Edward Island	$ 473 00
Nova Scotia	236 33
New Brunswick	336 00
Quebec	479 34
Ontario, Guelph	600 00
Ottawa	304 00
Manitoba	523 32
Saskatchewan	302 00
Alberta	400 00
	$3,653 99

The total subvention paid for provincial seed exhibitions is about $875 less than during the previous season. The reduction is largely accounted for through the cancel-

lation of the Maritime Provinces Winter Fair at Amherst, N.S., on account of the building being used for military purposes, and a reduction in the amount paid for prizes at the Ottawa Winter Fair.

ASSISTANCE TO C.S.G.A.

The Canadian Seed Growers' Association has been given the usual grant of $7,000 from the Seed Commissioner's Branch appropriation for maintaining the central staff and the inspection necessary in connection with the production of registered and improved seed.

FIELD ROOT AND VEGETABLE SEEDS.

The production of essential field root and garden vegetable seeds has increased materially during the past year. The obtaining of supplies from Europe becomes more difficult with the continuation of the war, and prices have advanced accordingly. Seedsmen have offered higher prices to have seeds grown in Canada, and my officers in charge of this work have arranged for the production of a large part of our requirements. The growing of mangel, sugar beet, and vegetable seed has been extended in British Columbia, and swede seed in Manitoulin Island, Quebec and the Maritime Provinces. The Experimental Farms Branch is co-operating, particularly in the growing of field root seeds, and it is anticipated that the 1918 seed crop will prevent a shortage of the more important kinds.

The quantity of home-grown seeds produced in 1917 was practically double that of 1916. Approximately 64,000 pounds of seed passed our inspection, and subventions were paid thereon amounting to nearly $2,400. The kinds and amounts produced were: Sugar beet, 49,000 pounds; mangel, 10,705; swede, 2,446; garden beet, 645; radish, 427; parsnip, 232; onion, 192; and smaller quantities of cabbage, garden carrot, tomato, and muskmelon. A much larger number of farmers and gardeners grew sufficient seed for their own use.

WESTERN CANADA TIMOTHY SEED.

Seed Branch officers have continued their attention to timothy seed production in Western Canada, particularly in Alberta, where this seed may be considered a by-product of intensive ranching. The seed is produced mainly in districts where the raising of live stock predominates, and in northern districts on land that is too rich and too moist to successfully mature cereal crops in the average year. The dry weather of last season seriously militated against production, but the seed was of excellent quality and found a ready market.

The Canadian Government terminal elevator at Calgary is equipped with cleaning machinery, and timothy seed growers are given the same service as growers of flax seed. The timothy seed is cleaned to grade which enables the growers to put it on the market in a finished condition. During the past season 980,107 pounds of timothy seed was received at the Calgary elevator. About 42 per cent was graded No. 1 under the Seed Control Act standards, 42 per cent No. 2, 13 per cent No. 3, and 3 per cent below was the standard.

The South Alberta Hay Growers are the heaviest producers, and sold their entire stock of cleaned seed from the elevator at prices for each grade in excess of Chicago market quotations. The northern growers are also organizing for purposes of production and sale.

SEED TESTING.

During the year ending August 31, 1917, 12,431 samples of seed were received at the Ottawa laboratory. About 70 per cent of these were sent by merchants, 25 per cent by farmers and the rest by various organizations. During the same period 13,547 samples were tested for farmers and merchants at the Calgary branch laboratory. Eighty-five per cent of these samples were submitted by farmers.

From September 1, 1917, to March 31, 1918, 10,300 samples have been received at Ottawa and 9,926 at Calgary, compared with 9,763 and 11,870 respectively for the same period last year. In addition to the samples received from merchants, farmers and others, the laboratories also made tests on 1,897 samples of vegetable seeds in connection with the paper packet seed investigation, 828 samples collected by officers of the department in enforcing the Seed Control Act, and 3,715 samples in connection with other investigational work of the laboratory.

FARMERS' GRASS AND CLOVER SEEDS.

More attention is now being given by the Seed laboratory to the examination and reporting of farmers' samples. Last season, 971 samples of red clover, 567 timothy, 276 alsike and 56 alfalfa, were received at Ottawa from farmers. A large proportion of these samples represented uncleaned lots which contained too many weed seeds to be legally sold for seeding purposes. Many of the impurities in this seed are such a size that their separation is impossible or necessitates very heavy dockage. In reporting on such samples these points are emphasized.

CLEANING SEED.

There are, however, a good many samples which may quite easily be cleaned to grade, provided the proper sieves are available. Few of the ordinary fanning-mills are equipped for this work and farmers are therefore placed at a disadvantage in disposing of their seed. To assist them Seed Branch pamphlet No. 1 on "Cleaning Seed" has been prepared. This pamphlet tells how to clean different kinds of seeds, including cereals, and is illustrated with cuts of the different types of sieves required.

INVESTIGATION WORK.

In addition to the purity and germination tests of samples sent by farmers and merchants several thousands of other tests are made every year in connection with the work of seed inspection, paper-packet seed investigation and investigations on methods of analysis, longevity of seeds, impurities of grain from different sources and other lines of research. The laboratory is still co-operating with the Association of Official Seed Analysts of North America in the study of methods of improving

seed analysis and other matters affecting seed control work. As the annual meeting was held this year on June 18-20 at Detroit, Michigan, several of the officers of the branch were able to participate in the proceedings.

EDUCATIONAL WORK.

The laboratory is continuing to give assistance to agricultural representatives and teachers who take up seed testing, seed judging, weed seed identification and related subjects with their students. It has been found necessary to discontinue for the present the preparation of our reference collections of 100 kinds of economic and weed seeds, but the laboratory is at the service of teachers and others who wish to have weed seeds or other seeds identified. Correspondence in connection with identification of seeds and other technical matters connected with seed testing is increasing from year to year.

SCREENING DISPOSAL.

The disposal of elevator and seed-house screenings in ways that will not lead to any further spread of noxious weeds is still under consideration. On account of the shortage of feed there was a greater demand than usual for grain screenings for use as feed. The Seed Branch has followed this matter closely, and has insisted that screenings so used should be ground after being thoroughly cleaned to remove the smaller weed seeds which our experiments have shown to be not only difficult to grind but useless and at times actually harmful as feed.

EXAMINATION OF FEEDS FOR INJURIOUS WEED SEEDS.

Complaints that mill feeds are sometimes adulterated by screenings which render the feeds harmful to stock are being investigated. The analysis of bran, shorts, and similar feeds for weed seed adulterants requires microscopic examinations. The weed seeds which are suspected of being injurious are not detected by the ordinary chemical analysis. Some of the most injurious are very high in protein and fat and by increasing the content of these constituents in the feed their presence, unless detected by the microscopic analysis, give it an appearance of enhanced value. This kind of work has been undertaken during the past year and it has been found that many of the samples of feeds submitted for analysis contain considerable quantities of mustards and other weed seeds.

SEED INSPECTION.

The enforcement of the Seed Control Act is under the direction of the chief seed inspector, with permanent district officers at Calgary, Regina, Toronto, Ottawa, Quebec, and Truro. These district officers are assisted during the busy season of the seed trade in the spring by temporary seed inspectors.

Last season the inspectors visited 3,547 dealers located in 1,317 towns. In some cases two or three visits were made to a place. Five hundred and one violations of the Act were detected, 94 for failing to have the grade marked on seeds of timothy, red clover, alsike and alfalfa, 46 for representing the seed to be of a higher grade

than it actually was and 72 for selling seed containing impurities in excess of the number permitted in seed which may be legally sold for seeding purposes. In addition there were 172 violations of section 6 of the Act, which requires all seeds except timothy, red clover, alsike and alfalfa, including other clovers and grasses, cereal grains and fodder and pasture plants to be labelled to indicate their noxious weed seed content. One hundred and nineteen lots were found offered for sale which were below the germination requirements. Two lots were sold in violation of both sections 6 and 10. It is chiefly local lots of seed which are found exposed for sale in violation of the Act although occasionally a wholesaler's lot is found marked with a grade higher than its quality or weed seed content warrants.

PAPER-PACKET SEEDS.

The paper-packet seed investigation was continued for the third consecutive season. Field tests to determine the quality and purity as to variety of some of the leading varieties sold in packets by the different wholesale seed merchants were carried out by the Horticultural Division of the Central Experimental Farm. These tests confirmed the results secured the previous season, viz., that certain dealers are supplying seed of very inferior quality in respect to uniformity and type character. The germination of most varieties tested was found to be satisfactory, although in a few cases, seed of very low vitality was being sold.

SEED PURCHASING COMMISSION.

The Seed Purchasing Commission was established in October, 1916, to provide against the possibility of any shortage of good seed grain, particularly in districts in which the cereal grain crop had been seriously injured because of unfavourable climatic conditions. I am pleased to report that the seed requirements of provincial and municipal governing bodies, farmers' organizations and seed merchants were fully supplied to the satisfaction of all concerned. The balance of the moneys provided by order in council for the purchase, storing, cleaning, and distribution of seed grain was promptly returned in the early part of this fiscal year.

It was deemed expedient to continue the services of this commission as an important part of general plans to stimulate the production of food grains. Reports of seed supply in several districts in the Prairie Provinces and in Eastern Canada indicated that large areas were without good seed grain of one or more kinds. Prolonged hot, dry weather had caused partial failure in the oat crop in southern areas of the Prairie Provinces. Large areas in the Maritime Provinces and in Quebec were without seed oats, and there was a very general demand for seed of spring wheat throughout Eastern Canada and also in some localities in Western Canada. Because of unfavourable weather in the province of Ontario the pea and bean crops were a partial failure and there seemed to be real need to secure and hold in reserve supplies of good seed. It appeared quite probable during the early winter months that a large quantity of seed peas would be needed for mixed grain fodder crops for ensilage purposes in lieu of seed corn. The corn crop grown for matured grain not

only in southern Ontario but throughout the northern areas of the corn belt in the United States, was very seriously injured by early autumn frost. In consequence rigid conservation of seed corn became a pronounced necessity. United States southern-grown varieties were made available for the ensilage crop, but it was not until quite late in the season that it was found practicable to spare seed corn for grain production in Canada. It is pleasant to record that under many difficulties of securing general seed supplies, there existed throughout a wholesome spirit of co-operation in the matter of exchange of seed between the United States and Canada, and it is expected that this relation will be continued throughout the period of the war.

The purchase of grain for seed purposes is based on grain exchange prices at time of purchase to which may be added a small premium for grain of a quality that will on recleaning conform to the established grades for seed grain. The Canadian Government elevators at Calgary, Saskatoon, Moosejaw, Transcona, Port Arthur, and Quebec city are used for the cleaning and distribution of all seed of cereal grains. Selling prices are fixed to cover the cost of the grain, expenses in handling, and the incidental losses that accrue in process of cleaning, transportation, and fluctuation of market values.

The work of the commission has proceeded satisfactorily, emergencies in respect to seed supply have been met, and it is anticipated that the total advance for this purpose will in due time be returned to the Receiver-General.

THE LIVE STOCK BRANCH.

During the course of the year, a new division was created in the branch, to which has been assigned special charge of the work undertaken in connection with the importation, purchase and distribution of feed. The nature of this work is explained later in the report. Mr. R. J. Allen, who has been on the staff of the branch since 1915 and who has had practical experience in the feed business, has been placed in charge of this Division.

THE LIVE STOCK AND LIVE STOCK PRODUCTS ACT.

As has previously been intimated, an important feature of the work to which the Live Stock Branch has given its attention during the past three or four years, has had reference to the improvement of marketing conditions and to the development of an extensive export trade. Specially trained officers have been located at the leading live stock markets in Canada, who, in addition to securing current information respecting receipts and marketings for use in the preparation of the weekly markets report, have rendered important and acceptable service in aiding farmers and feeders in the sale or purchase of stock and in promoting the return to country points of useful breeding and feeding animals. During the course of the work at the stock yards, it was found desirable that certain legislation should be enacted giving the Minister authority to exercise reasonable and necessary supervision as regards the management of the yards, the fees charged and the conditions under which live stock is purchased and sold. It was proposed, therefore, that special legislation should be

obtained providing such authority and the intention of the department in this direction was given effect through the passing of the Live Stock and Live Stock Products Act in August, 1917. In the initiation of this legislation and in the preparation of the draft Bill, the branch has been in close correspondence with, and has received the support and advice of, representative live stock men of Canada, special thanks being due in this connection to the president and executive of the Western Canada Live Stock Union for their counsel and aid.

In addition to the attention which has been directed to live stock markets, special work has been undertaken, having for its object the improvement of methods employed in the marketing of live stock products. The department has been convinced that a profitable and expanding export trade can be very effectively advanced through the exercise of supervision in the marketing of the product such that standard grades may be set respecting quality, uniformity, weight, methods of packing, etc., upon which the importer may confidently rely. With the view of meeting this need, an initial move has been made through the adoption of special measures relating to the egg trade. The purpose of the department in this direction has been given definite effect through the authority which is taken under the Live Stock and Live Stock Products Act, to require that all eggs intended for export shall be inspected before shipment. This authority covers both interprovincial and export movement, and provides that the inspection shall be on the basis of certain standards agreed to as between the producer, the produce trade and the department. It is believed that this legislation will go far toward improving and stabilizing the quality of our export shipments and in promoting the development of a trade which should satisfactorily compete with other exporting countries.

HORSE DIVISION.

FEDERAL ASSISTANCE TO HORSE BREEDING.

The intention of this policy is to encourage the farmers and breeders of Canada to work for the betterment of the horse industry by making use of sound, individually excellent pure-bred sires. With this purpose in view the policy was inaugurated in 1915. In that year only nine clubs qualified. The next year this number was increased by four. In 1917 over one hundred clubs were organized and of these ninety-nine were approved. The outlook for the season of 1918 is that there will be in the neighbourhood of two hundred clubs hiring approved stallions.

The scheme, as anticipated, has proven to be very popular. It enables districts to procure a much better class of sire than heretofore, and at the same time encourages importers to bring out a better class of horse and also enables owners to keep them profitably. With a large increase in the number of clubs it has become more imperative that a careful inspection be made of each stallion, also that the working of each club be closely supervised, otherwise the original intention, namely to encourage the use of only the best stallions and thus improve the horse industry, will be defeated. This policy of close supervision has been concurred in by some of the largest stallion owners as well as the oldest and most experienced horsemen of the country.

The branch has learned from inquiries and other sources that breeders through being able to secure the services of good stallions are looking for and wherever possible purchasing good pure-bred mares. Several claim that they would have purchased pure-bred mares before, had it not been for the difficulty of having them mated with a horse that should work improvement rather than deterioration in the offspring. This alone should result in the raising of a goodly number of high-class pure-bred stallions and mares and eventually in not only the general use of better sires but also will be the means of attracting foreign buyers.

DISTRIBUTION OF PURE-BRED STALLIONS.

At the end of the season of 1916 the branch decided to cease buying stallions to loan to associations and, as opportunity offered, to sell those that were on hand. A number have been disposed of; the rest are being loaned as heretofore to associations. Many of the districts where associations were first formed have given up the stallions and formed clubs. The horses thus released have been moved to more outlying sections where their services are greatly needed and where in many cases, but for this help farmers would be forced to use grade or scrub sires. This is particularly true of the four western provinces where by far the larger number of these horses are located.

The stallions have been particularly healthy, and after five years during which time one hundred and fifty-six horses were purchased and loaned under many and varying conditions, only fourteen have died. They have also proven to be sure foal-getters and have left a high percentage of useful colts in the districts where they stood for service. The value of pure-bred blood has been widely demonstrated; also what can be done through the farmers of the district working together and obtaining the use of good sires. The fact that there are to-day so many clubs in the West has been due in no small measure to the results obtained through the associations formed for the purpose of obtaining and caring for Live Stock Branch stallions.

CATTLE DIVISION.

DISTRIBUTION OF PURE-BRED BULLS.

On December 31, 1917, the total number of bulls purchased by the Live Stock Branch, since the inauguration of the distribution policy in 1913, totalled 1,897. These bulls are loaned only to specially organized associations in newly settled districts and backward sections in some of the older provinces where farmers are unable to purchase pure-bred sires for themselves. The improvement of the live stock of the districts which have been using the department's bulls for several seasons is already very apparent and has created much favourable comment. In fact, the effect of the policy has been its sole advertisement since 1914, and each year the branch has been forced to set a limit upon the acceptance of applications, owing to the impossibility of securing a sufficient number of suitable bulls to supply all associations desirous of obtaining assistance. In many districts, associations to which bulls were loaned during the first few years that the policy was in inauguration have since advanced to the

point where the increased size of their herds has warranted the purchase by individual members of pure-bred sires of their own. In such cases the department's sires have been returned by the associations with expressions of appreciation of the benefit derived from their use. A considerable reserve of bulls for use in more needy districts is thus annually created.

It is of interest to note that when a bull's usefulness as a sire is over he is by no means a total loss to the department. In the calendar year of 1917, 217 bulls were sold for beef purposes. The net proceeds received from the sale of these bulls amounted to 61 per cent of their original cost price as registered sires.

The following table indicates the total number of bulls on hand December 31, 1917, and the total number of bulls of each breed standing with associations on that date:—

Breed.	B. C.	Alta.	Sask.	Man.	Ont.	Que.	N. B.	N. S.	P.E.I.	Total.
Shorthorn..	27	226	270	102	83	134	2	11	16	871
Ayrshire..	12	1	3	...	6	217	14	23	6	282
Holstein.	12	5	11	8	14	49	2	3	2	106
Hereford	1	20	21	8	1	4	..	1	..	56
A. Angus...	2	8	10	6	..	...	..	..	..	26
Fr. Can...	..	...	...	...	..	35	..	..	..	35
Jersey	10	...	...	...	..	1	..	2	..	13
Guernsey	3	...	...	...	..	...	..	2	..	5
R. Polled	1	...	2	1	..	...	..	..	..	4
	68	260	317	125	104	440	18	42	24	1,398

Bulls in feeding stables which were afterwards loaned in 1918 distribution:—

Shorthorn..	12
Ayrshire..	2
Hereford..	2
Total..	16

Total number of bulls on hand on December 31, 1917, 1,414.

CARLOT POLICY.

Under the terms of the Carlot policy the Live Stock Branch has paid reasonable travelling expenses of a farmer or the authorized agent of a number of farmers in any section of Canada who purchased one or more carloads of breeding stock (horses, cattle, sheep or hogs) in any part of the country, or of feeding and stocker cattle at stockyards in Western Canada, provided such stock was not purchased for speculative purposes.

During the fall of 1916, and throughout the season of 1917, the Carlot policy was particularly effective in turning back to country points in Western Canada, an increasing percentage of the stocker and feeder cattle, as well as young heifers and ewes offered for sale at central stockyards. In 1915, in which year the application of the policy on stockyard purchases was not allowed, 82 per cent of the stockers and feeders received at the Winnipeg yards were shipped south. In the fall of 1916 the benefit of the policy was allowed on stockyard shipments. In that year only 42 per cent of the receipts were exported to the United States, while in 1917 only 30 per cent went south, despite the fact that the total receipts for this class of cattle were 50 per cent greater in 1917 than in 1916.

During the calendar year of 1917, 11,332 steers, 10,411 heifers, 1,800 sheep, and 170 hogs were purchased under the terms of the Carlot policy. Since October 10, 1916, on which date special application of the policy on stockyard shipments was first allowed, 37,973 head of cattle, sheep, and swine, valued at $2,094,000, have been shipped under the terms of the policy to farms in Western Canada alone. The cost to the department of the assistance rendered on these shipments averaged only 56.4 cents per head.

FREE FREIGHT POLICY.

In the fall of 1917 the Free Freight policy was inaugurated by the Live Stock Branch in co-operation with the railroad companies of Canada, to supplement the Carlot policy in preventing, as far as possible, the slaughter or exportation of useful heifers, young ewes and young sows offered for sale on the open markets at central stockyards.

Under this policy it has been possible to ship, from the stockyards to country points, female breeding stock of the classes mentioned without payment by the purchaser of the freight charges on same, provided the stock was not purchased for speculative purposes. Twenty-five per cent of the ordinary freight charges on such shipments has been borne by the railway companies, and the other 75 per cent has been collected by the companies direct from the Live Stock Branch.

As a result of the introduction of this policy the demand for breeding females at the different central stockyards has, in practically all cases during the past six months, exceeded the supply. The policy was introduced on September 21, 1917, and between that date and March 31, 1918, shipments returned to country points under its terms were as follows:—

Name of Stockyards.	No. of Cattle.	No. of Ewes.	No. of Sows.
Edmonton	2,865	848	149
Calgary	3,509	5,154	...
Winnipeg	4,885	1,347	191
Toronto	1,032	3,855	...
Montreal	164	357	...
Total	12,455	11,561	340

NOTE.—Sows not included in policy until the month of December, and then only in Western Canada.

RECORD OF PERFORMANCE.

Owing to the scarcity of help on the farms there has been a slight falling-off in the number of cows entered for the Record of Performance during the year 1917-18. Jersey and Shorthorn breeders, however, have entered more cows than in any previous year. Had conditions been normal, there is no doubt there would have been an increase in entries for all the dairy breeds.

Breeders of dairy cattle are now depending to a great extent on the information derived from the Record of Performance test to enable them to select stock which will improve their herds both in milk and butter fat production.

During the past year, there has been considerable discussion in the dairy papers regarding the long-and-short-time tests, and the consensus of opinion is much in favour of the former.

The members of the various Dairy Breeders' Associations at their annual meetings in February of this year discussed the Record of Performance test and as a few of the members were somewhat in favour of shortening the period of test from 365 to 300 days, representatives of each association were appointed to meet together and discuss the matter. A meeting of these representatives was held at Toronto on April 5 last and, after a full discussion, it was decided that the existing rules and regulations were in the best interests of owners and their cattle.

The Ayrshire, Holstein-Friesian, and Jersey Breeders' Associations are now giving valuable prizes annually for the cows standing highest in each class of the Record of Performance.

The following is a brief summary of the work for the year:—

Breed	Number Cows Entered.	Number Cows Qualified.	Number Bulls Qualified.
Ayrshire	614	175	4
French-Canadian	21	14	..
Guernsey	19	5	..
Holstein-Friesian	540	173	7
Jersey	246	68	..
Shorthorn	153	53	3
Total	1,593	488	14

APPENDIX.

The records tabulated in the appendix are for cows which have produced sufficient milk and fat to qualify, but which have failed to freshen within fifteen months after the commencement of the test:—

Ayrshire	30
French-Canadian	3
Holstein-Friesian	49
Jersey	7
Shorthorn	14
Total	103

SHEEP, GOAT AND SWINE DIVISION.

DISTRIBUTION OF RAMS AND BOARS.

The policy of loaning pure-bred rams and boars to farmers' associations has now been in operation for five years. Assistance of this nature is confined to districts where the farmers have difficulty in securing well-bred sires, or are in financial circumstances which restrict their ability to purchase the most suitable type of breeding male. In pursuing this work, it has been the purpose of the department to limit an association to a single breed, and advise persistent use of the original selection. Adherence to this system by societies has already shown results of the greatest benefit in fostering not only a keen desire amongst members to produce a better class of live stock but in creating, as well, a uniform type within a district. An advance toward the establishment of the community system of breeding, which obtains so satisfactorily in Great Britain, is a direct result of this policy of the department.

Upward of 1,700 rams and 500 boars have been bought and distributed since the inception of this policy. As these animals have gone chiefly to newly settled and outlying districts their use has been productive of not only a larger number but also a very much improved quality of both sheep and swine.

The tabulated statement following shows that all provinces to a greater or less degree took advantage of and were benefited by the services of these animals:—

BOARS loaned to associations of farmers. (Corrected to January 1, 1918.)

Breed.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Total.
Yorkshire	2	10	4	116	19	9	24	21	4	209
Berkshire	6	1	1	6	16	16	38	52	9	145
Pol. China	..	..	..	...	1	1	9	4	1	16
Duroc Jersey	..	..	..	...	..	1	7	17	3	28
Ches. White	..	5	1	35	4	..	..	..	1	46
Tamworth	..	..	..	5	..	2	1	1	..	9
Total	8	16	6	162	40	29	79	95	18	453

RAMS loaned to associations of farmers. (Corrected to January 1, 1918.)

Breed.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Total.
Shropshire	86	108	23	233	36	14	5	88	1	594
Oxf. Down	32	222	12	97	8	40	2	105	1	519
Leicester	15	8	14	279	63	7	4	...	..	390
Cheviot	5	4	3	21	..	..	..	...	..	33
South Down	8	19	1	12	2	..	..	...	4	46
Hampshire	..	..	7	62	..	..	..	...	..	69
Lincoln	..	..	3	14	4	..	..	...	..	21
Suffolk	..	..	..	...	..	6	..	...	..	6
Cotswold	..	..	..	1	2	..	..	...	..	3
Total	146	361	63	719	115	67	11	193	6	1,681

CO-OPERATIVE MARKETING OF WOOL.

The selling of wool co-operatively on a graded basis has shown a most wholesome increase since its inception in 1914. In 1914, 206,129 pounds of wool were graded for societies organized in four provinces, namely, Quebec, Ontario, Manitoba, and Alberta. In 1915 the number of organizations formed for this purpose was increased to nineteen. Approximately 420,000 pounds were classified and offered for co-operative sale. In 1916 this amount had reached the total of 1,721,598 pounds, and every province was represented. This year the total graded was 2,097,909 pounds with a value of $1,321,682.67.

Previous to the shearing season a public warehouse for wool storage was established in Toronto, to which associations could ship in the event of their having difficulty in disposing of their clips at point of collection. Southern Alberta and southern Saskatchewan associations, representing approximately 900,000 pounds of wool, took advantage of these storage facilities, shipping their wool to Toronto and putting on sale their product at this point. The average price obtaining over Canada for wool sold co-operatively was in the neighbourhood of 63 cents.

EXHIBITION WORK.

During the year, exhibits illustrative of sheep husbandry and wool in all its various stages of manufacture were exhibited at the principal shows throughout the

Dominion. At each show inquiries for sheep literature resulted in thousands of bulletins and pamphlets on sheep subjects being distributed.

At Toronto, the exhibit was visited by thousands daily, while many returned for a second inspection. It covered a wide field. The various diseases and insect parasites which afflict sheep were illustrated by stereopticon views; proper housing, care and management were illustrated by model sheep barns, racks, troughs, pens, dipping tanks, and fences. These attracted the attention of the farmers generally, and were of particular interest to the practical sheepman. The care and handling of fleeces and the various stages in the manufacture of woollen goods were also shown. A large exhibit in itself of woollen goods containing cloth of various kinds, and rugs of beautiful design added to the attractiveness of the display. Every feature of this exhibit was interesting and instructive, but no part drew greater crowds or aroused more enthusiasm than the practical demonstration of the old and new methods of manufacturing wool into cloth.

On one side, two women were to be seen carding wool, making it into rolls, then spinning and afterwards weaving it into cloth. The cards, spinning wheel, and loom they were using were somewhat over one hundred years old. On the opposite side, the same processes were demonstrated but in a very different way. The latest machines man's ingenuity has invented were doing the work. The official in charge, who had come direct from one of the largest mills, spent his time in explaining to all who were interested the latest methods now employed in manufacturing wool, and how one man could look after a number of machines capable of doing the work of a score or more people under the old system.

This exhibit was given favourable notice by the press, and was highly commended by hundreds of the visitors, some of whom went so far as to say that it was one of the best, if not the best, on the grounds; in fact, this view was also concurred by some of the officials of the Great Show.

GOAT INSPECTION.

During recent years, the number of goats kept in Canada has greatly increased. In order to keep record of their breeding, it was found necessary to open a Herd Book. Before doing so, it was necessary to make an inspection to ascertain what animals were eligible to be taken in as foundation stock. This work was carried out by an officer of the Sheep Division who inspected goats from Cape Breton to British Columbia.

INCREASED HOG PRODUCTION.

A campaign for an increased production of hogs was undertaken, following a statement by the Food Controller as to conditions in Europe, and the urgent need for an increased supply of bacon and pork products by the allied countries on that continent. For the purposes of organization, the Live Stock Commissioner called into conference representatives from the various provinces, including representatives of the provincial Departments of Agriculture. The Food Controller was also in attendance, and the responsibility resting upon Canada in making up the needed food supply as related to meats and fats was shown. Discussion as to ways and

means followed, and, as a result, assurance was given by the provincial representatives that the whole organization of the various provincial Departments of Agriculture would be utilized to the fullest extent in placing before the people of each province the information received and brought out in the discussion at the conferences. The representatives went immediately and systematically to carry the word direct to practically every farm in the Dominion. The assistance of farmers' organizations, as also of associations connected with the live stock industry was secured, and the support of agricultural and other newspapers was heartily given. The Live Stock Branch having become responsible for the campaign, which was of a Dominion-wide nature, was authorized to share a portion of the provincial expenses, so that effectiveness would be assured. A series of display advertisements was prepared and published in the agricultural papers, and papers having special agricultural pages. These advertisements were afterwards distributed in the form of posters to all the branch banks in Canada. The support of the banks was solicited, and the response was hearty and unqualified. As a result of the co-operation of these various bodies, the facts of the situation with regard to the need for increased hog production were plainly, dispassionately, and thoroughly placed before the live stock producers of Canada. A response was given and, taking the country as a whole, there is confidence that during the coming season there will be an increase of at least 15 to 20 per cent over the killing for the same period of the previous year.

POULTRY DIVISION.

While the number of poultry in Canada has not materially increased during the past year, it is estimated that the value of eggs and poultry marketed was between seventy and seventy-five million dollars, of which eggs represented from fifty-eight to sixty millions. This is the result of the notable increase in the value of the product and the better quality of the stock being kept. Prior to the commencement of the war, Canadian consumptive requirements absorbed all of the supply, but with the increase in production that has taken place since 1914 Canada has been able to ship to Great Britain annually from three to five million dozens.

SPECIAL POULTRY ADVERTISING CAMPAIGN.

A special advertising campaign to increase egg and poultry production was put on last spring coincident with and supplementary to the production campaigns carried on by the provinces. Pointed advertisements, with suitable illustrations, were run for a period of one month in the principal agricultural and poultry papers and supplemented by the wholesale distribution to banks, post offices, railway stations, and other public institutions of a placard setting forth the need and the possibilities of increased production. Very satisfactory results were obtained in the way of increased hatchings, especially in the western provinces, Ontario, and Prince Edward Island.

EGG TRADE IMPROVEMENT.

Early in the egg trade improvement campaign carried on by the department during the past few years, it was apparent that maximum results could not be obtained without bringing to bear some specialized effort in an administrative capacity.

The wholesale trade was anxious that legislation be provided that would make it an offence for any one to offer for sale eggs unfit for food. No action was taken, however, other than to point out that this matter was covered by the provincial and municipal health Acts, and the Adulteration Act on the Federal statutes; the feeling being that it would be more in the national interest to standardize and improve the quality of the good eggs than for the department to concern itself particularly with the negative side of the problem. With this end in view there was included in the "Live Stock and Live Stock Products Act," passed by Parliament in the last session, a clause prescribing the manner in which eggs and poultry, etc., may be standardized or graded, and also the kinds of packages which may be used and the method in which such packages shall be branded, marked or labelled.

Under the provisions of this Act, regulations have been prepared which provide in detail, standards for the Canadian eggs and also require that the packages containing Canadian eggs intended for export be marked with the words "Canadian eggs," and with the class and grade of the eggs contained therein. Similar provisions are also included covering interprovincial shipments of eggs in lots of one hundred (100) cases or more.

CO-OPERATIVE MARKETING OF EGGS AND POULTRY.

The high prices prevailing for eggs and the keenness of competition for eggs of high quality has given a strong impetus to co-operative organization during the past year, and this, together with the assistance extended by the department, has led to the organization of many new units, and also to a marked increase in the membership of the older associations.

One of the best testimonials for the utility of co-operative effort in the way of egg trade improvement is the fact that the best eggs now available in Canada in car lots come from the province of Prince Edward Island, the point where co-operative marketing of eggs and poultry has reached its highest state.

In Ontario some centralization of effort has taken place, and the way has been paved for further progress in this direction. In Alberta the receipts of eggs at the central candling station this spring are very greatly in excess of last year while the number of shipping points has increased to nearly one hundred.

STOCK IMPROVEMENT.

An important development during the past year, a direct outgrowth of the co-operative work, has been certain activities along lines of stock improvement and flock inspection. It had been evident for some time that a large percentage of the lower grade eggs and poorer quality of poultry received at the central grading stations was due to the undersized, mongrel stock kept by many of the members. The importance of pure-bred stock of desirable varieties was strongly emphasized,

and a plan outlined whereby the best in each community could be utilized to improve the whole. At the suggestion of the department, certain of the associations announced to their members that they were prepared to supply eggs for hatching from pure-bred flocks, that those who wanted eggs were to make application to their secretary, and that those wishing to participate in the distribution were to make application to have their flocks inspected, the understanding being that the department was to supply an inspector. The result has been very satisfactory, several hundred farmers having made definite application for an officer of the department to visit them and advise as to the quality and condition of their flock, the officer at the same time indicating whether or not it was of a standard to warrant approval for participation in the distribution scheme

EGG AND POULTRY MARKETS REPORT.

With the rapid expansion of the poultry industry in recent years the question of markets and the maintenance of fair prices to producers has become of increasingly great importance. Investigations carried out by officers of the Poultry Division previous to the war pointed to a very one-sided argument for the producer in marketing his product. The produce trade was fully informed regarding the possible demand and market fluctuations, while producers as a whole had little or no first-hand information. Price largely controls production, and it was felt that by placing the producer on the same intelligent plane as that held by the dealer, producers could be given that confidence in the future of the market which would insure a constant and steadily increasing supply.

To this end, for some time officers of the Poultry Division had been quietly working on a form of intelligence service to meet this contingency, and with the commencement of the fiscal year it was decided that the intelligence service had reached a point that some publicity might be given to the reports then being prepared. That departmental activities along this line are well taken is evident by the keen demand there has been for this report since it was issued, and from the expressions of appreciation received from producers, co-operative associations, country merchants, and also the trade, there is no doubt that the egg and poultry markets' report fills a long-felt want.

The main report is compiled and mailed on Tuesday of each week, and is sent only to those making application for it. In addition, a daily report is now being prepared and is sent free by mail to all those desiring, or by telegram "collect."

THE EGG EXHIBIT.

Continuing the policy of setting forth by means of exhibits various phases of departmental activity, "Co-operation in Marketing" was the topic featured in the principal exhibit sent out in the spring of 1917. Flanked on either side by panels illustrating the open market of Egypt and the co-operative system of Denmark, the centre panel was devoted to a large map of Prince Edward Island, and by means of

small electric lights the locations indicated of the fifty or more local units now operating and known collectively as "The Prince Edward Island Co-operative Egg and Poultry Association."

The object of the exhibit was to bring to the attention of the people in Canada the advanced system of co-operative marketing in operation on Prince Edward Island, and to show how producers in other sections can work along similar lines for the ultimate benefit of the individual and the community.

FEDERAL AID TO FAIR ASSOCIATIONS.

Similar assistance to Fair Associations throughout Canada has been granted as in the case of the past two years. That the institution of the policy was a wise undertaking has been amply demonstrated by the support and stimulus which has been given to live stock production and distribution through the activities of fair associations, many of which would otherwise have found great difficulty in continuing operation. Particularly has this been the case in Western Canada, where important live-stock meetings have been held and extensive sales of pure-bred live stock conducted. The interest and enthusiasm which has been developed at both shows and sales, together with the business transactions which have been fostered in connection therewith, have given a great impetus to the live-stock industry in both Eastern and Western Canada. The fairs also are progressively developing educational features which are of growing importance.

There were in all thirty-three fairs which participated in the aid granted during the past year, the total amount of the grants aggregating $133,481.64.

MARKETS INTELLIGENCE SERVICE.

This service was organized for the purpose of supplying information to the producer which would assist him to market his live stock with an intimate knowledge of conditions affecting the market. The work first, has naturally centered around the large live stock markets at Montreal, Toronto, Winnipeg, Edmonton, and Calgary. The live stock trade of the country is centered about these yards, and transactions and operations there act as an indicator of the general market situation. These markets, therefore, have been made use of as the principle source of information until such time as the work may be sufficiently extended to admit a more direct communication with the producer. Representatives have been located at each of these yards, whose duty it is to supply details as to transactions and make an interpretation of the trading conditions found there. The information includes the grading and number of live stock received, the district from which they came and the disposition made of them, whether to the abattoir, back to country points for feeding, or exported. Details are given as to sale prices for each of the different grades; this includes the high and the low levels for each grade, the range within which the large proportion of any particular grade has been sold, and the average price for each grade of live stock. The market comment covers general information with respect to the

market which cannot be statistically classified. These reports after being received are classified and co-ordinated, and distributed through the agricultural press by means of a weekly letter supplemented by a classified statement covering grading, prices and disposition. Similar reports are issued at the end of each monthly period, while a statement covering the calendar year of 1917 was issued the first week in January.

While the special duties of these representatives are in connection with the Intelligence Service, they have been in a position, and have taken advantage of it, to be of very material assistance to many of those who have business to transact at the yards and who are unfamiliar with the ordinary procedure of doing busin ss there. They are in an exceptionally good position to be of service to those wishing to secure breeding or feeding stock. Many commendatory statements have been made by those who have availed themselves of the services placed at their disposal in this way. Their services have also been used in carrying out the different policies of the Live Stock Branch in operation at stock yards.

FEED DIVISION.

During the late summer and fall of 1917, there occurred a great shortage of cattle feed, and the situation became quite serious. Practically all sections of Canada were directly affected, and a curtailment of live-stock production seemed imminent. The demand for mill feeds and other by-products greatly exceeded the supply, and it soon became apparent that something should be done to assist the feeders to procure their requirements.

It having been previously determined, by most careful experiment, that a certain portion of the screenings from our western grain possessed excellent feeding value, consequently it was thought that this material should be used to offset, to some degree, this extreme shortage. To this end a conference was held at Winnipeg, on September 25, of representatives of the western grain growers and live stock associations, together with representatives of the terminal elevator companies, when the matter was thoroughly discussed. Following this, the question was again considered at conferences held at Ottawa, where both eastern and western feeders and breeders were well represented. It was then decided that these screenings should be utilized, and arrangements were made whereby the department agreed to take over from the elevator companies, at a fair valuation, all re-cleaned screenings, and dispose of same direct to farmers and farmers' organizations at cost.

These screenings were composed largely of broken wheat and wild buckwheat, together with a small percentage of chaff, wild oats, and other seeds. The chemical analysis of this mixture showed it to contain 14 per cent protein, 5 per cent fat, and 8 per cent crude fibre. The feeding value proved to be exceptionally good, and excellent results were secured, especially when fed to hogs.

The demand for this grade of feed was considerably greater than the supply, this being especially the case during the winter months, when feed was very scarce, and bran and shorts were practically unobtainable. Over 150 carloads of these screenings have been sold and distributed.

The amount of screenings procurable, however, proved insufficient to meet our total feed requirements, and consequently it was necessary to make arrangements to provide for the purchase of other feeds, domestic and foreign, that might be available from time to time. The needs of the dairymen had to be considered, and to this end approximately 7,168 tons of linseed oil cakes were purchased and distributed. The demand for corn was also very great, and arrangements were made with the United States Food Administration to permit of the importation of an adequate supply. At first certain difficulties were experienced in moving this grain, on account of railway and other embargos, but these were gradually overcome, and approximately 152,599 bushels were imported and distributed to sections where the demand was greatest.

In addition to the feeds already mentioned, 127 carloads of bran and shorts were purchased and distributed at cost. However, when the embargo on mill feeds was made absolute, the handling of bran and shorts was discontinued.

The Feed Division has recently undertaken a thorough investigation of all feeds now being offered for sale in Canada, it being the intention to maintain a constant and careful inspection of same to ensure the feeders against fraud by insisting that the various standards required or guaranteed be strictly adhered to.

DOMINION EXPERIMENTAL FARMS AND STATIONS.

In addition to the regular activities of this branch, which may be briefly described as the carrying on of experimental work in all the main lines of agriculture on all the fully established Farms and Stations, the conducting of special research work in the laboratories at the Central Farm, and the clearing and equipping, as rapidly as may be, of the newer Experimental Stations, must be added some special lines of work conducted last year and arising from war conditions. These are dealt with more fully further on in this report under the headings of the divisions having direct supervision of the work and need only be mentioned here.

The war demand for flax products has been steadily increasing, and every effort has been made to promote the growing of flax for fibre. The flax mill at the Central Farm has been completed, and is giving satisfaction. Excellent samples of fibre have been secured from experimental flax plots located in various sections of Eastern Canada. The question of flax harvesting machinery has been studied and progress made in the search for a practical machine. Interest in flax growing has been stimulated by organization meetings, publications, and press articles.

Steps have been taken to meet the shortage of root seed by growing large quantities of stecklings for seed production. Similar arrangements have been made for vegetable seed growing and it is expected that by this means, a large proportion of Canada's seed demands will be met in 1919.

The vacant-lot gardening movement has been given stimulus and aid by the Horticultural Division, through lectures, publications, and practical demonstrations.

A series of demonstrations in canning fruits and vegetables was given at the Central Farm during the summer and early autumn. These were well attended, and great interest was shown.

At the Plant Pathological Laboratories, those at Charlottetown, P.E.I., and Fredericton, N.B., continued the investigation into potato diseases, doing a large amount of field inspection work in connection therewith. At St. Catharines the officer in charge was principally engaged in the work of eradicating the white pine blister rust where found on currant bushes in that district. The laboratories at Brandon and Indian Head were engaged in the preliminary studies of rusts attacking cereals on the prairies and in working out a basis of co-operation with the provincial authorities for wider investigations into this subject.

During the year the following publications have been issued or are now in the press:—

The Annual Report of the Experimental Farm for 1916-17.
In the Regular Series of Bulletins—
No. 90. The Potato in Canada. A popular edition of this bulletin has also been issued.
In the Second Series—
No. 32. Manuring of Market Garden Crops.
33. Black or Stem Rust of Wheat.
In pamphlets—
No. 15. Digging and Storing of Potatoes.
16. Finishing Lambs for the Block.
In Special Circulars—
No. 11. Barnyard Manure.
12. Every Gardener his own seed Grower.
13. The Milking Machine.
14. Fertilizer Economy in War Time.
15. Self-feeder for Hogs.
16. Labour saving on the Farm.

Besides the publications listed above, over one hundred press articles on various agricultural subjects have been distributed to the Canadian press, and three issues of "Seasonable Hints" have been sent out.

Owing to the backwardness of the spring of 1917, and the consequent delay caused in seeding, many farmers found it impossible to sow as much wheat as they intended and a relatively larger acreage was devoted to later sown crops. While the grain yield in the Prairie Provinces was lower than usual, owing to severe frosts in May, and continued dry weather until just before harvest, the grading quality of the crop was excellent, and this, together with the further increase in prices, considerably offset the low yields. The season in the Maritime Provinces and Quebec was a poor one, but in Ontario general conditions were excellent, and the season was one of the best on record.

The area in the Dominion under root and fodder crops showed an increase of approximately 700,000 acres over 1916, the increase in value of these crops being $22,-344,900. Although the yield per acre of potatoes was the lowest on record, a largely increased acreage and higher prices caused the total value of this crop to be nearly $30,000,000 greater than the previous year.

While the yield of hay and clover was slightly less than the previous year, yet it was more than for any year prior to 1916.

In 1917 for the first time in Canada's history the value of her field crops exceeded one billion dollars, the total value being $1,144,636,450, as compared with $886,494,900 in 1916 and $825,370,000 in 1915.

Below are tabulated some data on the yields and value of the principal field crops of Canada in 1916. A table is also given showing the numbers of the principal classes of live stock in the Dominion during 1913-17, inclusive.

AREAS and Estimates of Yield and Value of Field Crops, 1918.

Crop.	Area.	Yield per Acre.	Total Yield.	Weight per Measured Bushel.	Average Price per Bushel.	Total Value.
	Acres.	Bush.	Bush.	Lb.	$	$
Fall wheat	725,300	21·50	15,533,450	59·37	2·08	32,336,900
Spring wheat	14,030,550	15·50	218,209,400	59·48	1·93	420,701,700
All wheat	14,755,850	15·75	233,742,850	59·46	1·94	453,038,600
Oats	13,313,400	30·25	403,009,800	33·55	0·69	277,065,300
Barley	2,392,200	23·00	55,057,750	46·97	1·08	59,654,400
Rye	211,880	18·25	3,857,200	53·44	1·62	6,267,200
Peas	198,881	15·25	3,026,340	59·81	3·54	10,724,100
Beans	92,457	13·75	1,274,000	59·70	7·45	9,493,400
Buckwheat	395,977	18·00	7,149,400	46·49	1·46	10,443,400
Mixed grains	497,236	32·50	16,157,080	44·41	1·16	18,801,750
Flax	919,500	6·50	5,934,900	54·73	2·65	15,737,000
Corn for husking	234,339	33·00	7,762,700	56·18	1·84	14,307,200
Potatoes	656,958	121·50	79,892,000	....	1·01	80,804,400
Turnips, mangels, etc.	218,233	290·75	63,451,000	....	0·46	29,253,000
		Tons.	Tons.		Per Ton.	
Hay and clover	8,225,034	1·66	13,684,700	....	10·33	141,376,700
Fodder corn	366,518	7.34	2,690,370	....	5·14	13,834,900
Sugar beets	14,000	8·40	117,600	....	6·75	793,800
Alfalfa	109,825	2·39	262,400	....	11·59	3,041,300

NUMBER of Farm Live Stock in the Dominion, 1913-17.

Live Stock.	1913.	1914.	1915.	1916.	1917.
Horses	2,866,008	2,947,738	2,996,009	3,258,342	3,412,749
Milch cows	2,740,434	2,673,286	2,666.846	2.833,433	3,202,283
Other cattle	3,827,373	3,363,531	3,399,155	3,766,718	4,718,657
Sheep	2,082,381	2,058.045	2,038,662	2,022,941	2,369,358
Swine	3,448,326	3,434,261	3,111,900	3,474,840	3,619,382

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

Work on the land started on May 3, and both wheat and oats were sown on the 8th of that month. Favourable growing weather in June, July, and August caused all crops to mature satisfactorily, although the wheat crop was a little below the average owing to insect pests and fungous diseases. Hay turned out better than was expected. Potatoes gave a good yield and were free from blight, while the crops of roots and corn were exceptionally good. Twenty acres of mangels were grown for seed.

A number of steers and lambs were purchased in the fall, for experimental feeding during the winter, and all live stock have wintered well.

EXPERIMENTAL STATION, KENTVILLE, N.S.

Up to the end of April most of the land at the Station was too wet to be worked, and heavy precipitation in May retarded seeding operations considerably. Bright

weather during the latter part of June materially assisted crop growth. Rainy weather during July and August held back haying operations, and wind storms did considerable damage to the corn, grain and apple crops. The wheat yield, on the whole, was light, and corn and potatoes were only fairly good.

A quantity of turnips were sown for root seed production, but owing to wet weather in October, considerable difficulty was experienced in getting them off the land.

EXPERIMENTAL FARM, NAPPAN, N.S.

Dull, rainy weather in May held back seeding operations, which did not become general until the beginning of June. Twenty acres of newly cleared land were sown to turnips for seed. The hay crop was not so good as was expected. September was a fine month for harvesting, and the grain was stored in excellent condition, but the yields were light. Frost in the middle of the month caused considerable damage to vegetables and flowers, and unfavourable weather in November interfered with the harvesting of the root crop.

A new steer-feeding shed was erected during the year, and a number of steers were put under feeding test during the winter. A commencement was made in the building of a new piggery.

EXPERIMENTAL STATION, FREDERICTON, N.B.

Ploughing started on April 30, but weather during May interfered with seeding operations. Continued unfavourable weather in June retarded crop growth, especially on heavy undrained land. All grain crops were considerably below the average in yield and quality. Forty-five acres were seeded to turnips for seed production. Potatoes gave only a fair crop. A great deal of fall ploughing was done in October, and all live stock entered the winter in good condition.

Changes were made in the old cellar and store-house in order to improve the facilities for storing root crops and potatoes.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIÈRE, QUE.

As in other districts in Eastern Canada, the spring was about three weeks late at Ste. Anne de la Pocatière, and a good deal of the land intended for wheat and other grain crops was sown to roots. Owing to unfavourable weather the hay crop was of poorer quality than usual. Hoed crops did well, but grain crops were only fair. The field roots, both those sown for seed, and also those sown later for seed production, yielded well. Potatoes gave an average crop, both as to yield and quality.

Twenty-six acres of stecklings were grown, harvested, and pitted in good condition.

A new poultry house and a new piggery were built during the year.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

Although the season in Central Quebec was ten days later than usual, all seeding operations at the Cap Rouge Station were finished in May. Notwithstanding the

heavy precipitation, crops on the underdrained land at the Station did exceptionally well. The yield of grain was a little higher than the average, but the weight per bushel was slightly less. All other crops gave average returns.

A great deal of work with live stock was carried on during the year, and a new calf barn was built.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

The first ploughing was done on this Station on April 18, and the first seeding April 30. Cold weather in May retarded growth somewhat, but seeding operations generally were carried on under favourable conditions. Heavy precipitation during July and August interfered with haying operations, but better weather in September allowed the grain to be harvested in good condition. Most crops, however, were below the average of previous years.

The work with live stock at Lennoxville was increased during the year, and a number of steers and lambs were put under feeding test during the winter.

The buildings erected during the year include a new dairy building, a poultry administration building, a permanent poultry house and a silo.

EXPERIMENTAL STATION, SPIRIT LAKE, QUE.

Preparatory work was continued at this Station during the year. The crops grown on the cleared land were only fair, owing to unfavourable conditions. A start in livestock work was made, there being now twenty head of horses and seven cows on the Station. Work with poultry has also commenced.

EXPERIMENTAL STATION, KAPUSKASING, ONT.

The work of clearing at this Station was continued during the year, the labour of interned prisoners being utilized for this purpose. During the winter the lumber was sawn on the Station and will be used for farm buildings.

Crops were grown on some 150 acres that had been cleared previously, and gave fair returns.

A house for the foreman-manager was built during the year.

Work with live stock was carried on, there being now fourteen horses and fifty-six head of cattle kept on the Station.

EXPERIMENTAL STATION, MORDEN, MAN.

The spring was rather backward but grain seeding was finished by the middle of May. The hay crop was light owing to dry weather in June and July, but the grain crops yielded fairly well. Work in horticulture was continued, orchards and ornamental grounds being laid out and work in vegetable gardening carried on.

A flock of seventy sheep is kept on the Station, and other work with live stock includes the experimental feeding of steers during the winter.

The buildings erected during the year consisted of a granary, a sheep barn and a silo, and various repairs to other buildings were also made.

EXPERIMENTAL FARM, BRANDON, MAN.

Seeding started at the beginning of May and was completed by the end of that month. Very dry weather in May and June caused grain to be very backward and also lessened the hay crop very materially. The drought continued during July and August, and consequently the yields of all cereals were light, although the grain was of good quality. The corn crop was injured by frost.

The buildings destroyed by fire in December, 1916, were rebuilt during the year, a new cow-barn, horse stable, and utility barn being built.

A number of steers were purchased in the fall, for experimental feeding during the winter.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

The season opened favourably at Indian Head, all seeding being finished by the end of May. Although the weather during the growing season was rather dry, all grain crops gave good returns and the quality was excellent. Hoed crops and hay were a little better than expected, while potatoes gave a fair yield and the quality was good. Exceedingly fine weather in the fall allowed more ploughing to be done than usual.

As in previous years, steer-feeding experiments were carried on during the winter.

A new poultry house was built during the year, and the sheep barn remodelled.

EXPERIMENTAL STATION, ROSTHERN, SASK.

Wheat seeding was completed at the Rosthern Station by May 12, and good rains in June caused all grain and hoed crops to develop well. A great many of the trees and shrubs were found to have winter-killed, owing to the damage sustained in the hail-storm of the previous fall. Dry weather at the end of July held back growth, but better weather conditions later in the season caused the grain to fill remarkably well and the yields were found to be greater than usual, all the grain being of good quality. The yield of potatoes was also large.

Sixty steers were purchased for experimental feeding during the winter.

A new granary and a pump house were built during the year.

EXPERIMENTAL STATION, SCOTT, SASK.

The weather in April was rather unfavourable for seeding operations, but it improved in May and the grain sown on well worked fields grew rapidly. Dry weather in June and July lessened the grain yield, and this continued during August. Oats and barley gave low yields, but the wheat crop was greater than had been expected. Hoed crops and potatoes gave average returns.

A poultry house and a poultry administration building were erected during the year.

Steer feeding tests were carried on during the winter.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

Work on the land was commenced at this station April 4, and the first seeding was done on April 7. Insufficient precipitation during June and July retarded the growth of grain crops, and although better weather was experienced in August, the yields of

cereals were considerably lower than the previous years. Hay and clover gave fair returns, but alfalfa was not so good as usual. The yield of potatoes was fair.

Feeding tests were carried on with steers and lambs during the winter.

No building operations of any importance were carried on during the year.

EXPERIMENTAL STATION, LACOMBE, ALTA.

Spring work commenced a little later than usual, but favourable weather towards the close of the growing season brought the crops to maturity rapidly. The yields of cereals were a little lower than usual, but this was offset by the uniformly good quality of the grain harvested, especially wheat. The hay crop was abundant, and roots and potatoes also did well.

Work with live stock was increased at this Station during the year, a large number of hogs being fed. Steers for experimental feeding were purchased in the fall.

No building operations of any importance were carried on during the year.

EXPERIMENTAL STATION, SUMMERLAND, B.C.

Seeding commenced at this Station on April 19. The season generally was rather dry, and this resulted in the crops of grain, especially oats, being light. Clover and alfalfa were also below the average in yield. Apples gave a good crop and pears a medium one. The potato crop was below the average, many of the tubers being small. In connection with the work in root seed production, carrots and mangels were grown for seed at Summerland.

A new office building was erected on the Station during the year.

EXPERIMENTAL STATION, INVERMERE, B.C.

Spring was much later than usual, and on the non-irrigated portion of the Farm, most of the crops suffered from the drought which occurred in July and August. On the irrigated area, alfalfa and clover gave good returns, but the grain yield was rather light. The potato yield also was light, but the tubers were of good quality. Vegetables, especially tomatoes, did very well.

A great deal of work with poultry and bees was carried on during the year.

The new land recently added to the Station area was cleared in the spring.

No building operations of any importance were carried on.

EXPERIMENTAL FARM, AGASSIZ, B.C.

Although spring opened up rather late, fine weather in May allowed all crops to be sown in good condition and in fairly good time. There was a good crop of hay, which was harvested in good condition, but hot, dry weather in July and August hastened the maturing of the grain, which consequently gave light yields. The potato crop was a very good one, and the crop of roots was fair. Stecklings were grown for root seed production.

No buildings of any importance were erected during the season.

EXPERIMENTAL STATION, SIDNEY, B.C.

Favourable weather at the beginning of the season gave promise of good crops. Autumn-sown cereals yielded well, but grain sown in the spring was held back by hot, dry weather in July. The corn crop was good, but potatoes were a little below the average. Fruit also did not give such good yields as in other years. Turnips and mangels were grown for root seed production.

A new implement shed was built, and various repairs carried out on other buildings.

SUBSTATIONS.

Experimental work was carried on during the year at the Substations at Fort Smith, Fort Resolution and Fort Providence in the Northwest Territories, Beaverlodge, Fort Vermilion and Grouard in Northern Alberta, and Salmon Arm in British Columbia.

Reports and samples of grain grown at these points have been received.

DIVISION OF CHEMISTRY.

Though not differing markedly as to character as compared with that of former years, the work of this division has been more particularly directed to such matters as were connected with greater food production on the farms of the Dominion. The assistance that chemistry can give towards obtaining larger crop yields and the more profitable feeding of stock is in these days fairly well understood and widely recognized and it is gratifying to note that farmers as a class are availing themselves of the opportunity which is offered them through this Division to obtain that information which will permit them to work their farms to greater advantage and profit. Possibly the most valuable phase of this educational and advisory work is accomplished through correspondence and the examination and reporting on agricultural samples sent in by farmers. The information thus afforded meets directly the particular needs of the individual and is thus more apt to be acted upon than that which is distributed in the form of printed matter, and takes into consideration the specific condition under which the farmer is operating. It would seem reasonable to conclude that the large correspondence in such matters, in addition to the issuing of bulletins and circulars on subjects pertaining to special phases of farming, has materially assisted in the campaign for increased production of foodstuffs throughout the Dominion. In this connection it is only necessary to add that the inquiries from farmers and the samples forwarded by them for examination cover a very wide field; they relate to and include soils, naturally occurring fertilizers (mucks, marls, mussel muds, seaweed, etc.), limestones, fodders, and feedingstuffs, insecticides and fungicides, and well waters.

The samples received at the laboratories during the year number 3,849, of which about 1,300 were forwarded by farmers, the remainder being those collected and analyzed in connection with special investigations carried on by the Division.

In the work undertaken for the Irrigation Branch of the Department of the Interior, towards the classification of certain lands in irrigable areas in Alberta, good

progress has been made. Fifty groups of soil, comprising 200 samples, have been submitted to analysis and reported on. The investigation, now in its fourth year, has for its chief object the determination of the "alkali," where such is present, and the reporting upon the lands in question as to their suitability for cultivation under irrigation.

With the co-operation of the Meteorological Service the investigation to ascertain the influence of climatic and seasonal conditions upon the yield and composition of wheat has been carried forward. This work involves much careful observation of a detailed and tedious character and it will be only after the results of many years have accumulated and the skilful correlation of the field, laboratory and meteorological data that we can hope to make any definite pronouncement in regard to this problem. The outlook, however, is such as to promise much valuable information.

Investigational work with fertilizers has been carried on at a number of branch farms and stations as well as on the Central Farm, Ottawa. Though it would be impossible to epitomize the results for this report, it may be stated that the returns conclusively show, that where judiciously used, and especially in conjunction with farm manures and a rational rotation of crops, commercial fertilizers may be used with profit. This conclusion is drawn more particularly from the experiments conducted in Eastern Canada and British Columbia. It is true that the price of fertilizers has greatly increased during the past year, but the increase in price of farm products and especially of those crops for which fertilizers are usually employed has proved an effective offset, so that in point of fact the profit from their use has been greater than in pre-war times when fertilizers were much cheaper.

The results in connection with the sugar beet investigation were most satisfactory. Seed of four approved factory varieties, including seed produced in Ontario, was sown on sixteen of the branch farms and stations throughout the Dominion and the product analyzed as to sugar content and purity. The past season's results constitute the twentieth record in this investigation and furnish additional evidence of the suitability of soil and climatic conditions at many widely distant points in Canada for the production of beets of excellent quality. It is particularly gratifying to note that the beets from Ontario grown seed fully equalled in sugar content and purity those from imported seed.

The eleventh year's work in the determination of the fertilizing value of rain and snow has been completed. The results indicate that the soil receives from these sources per acre per annum, approximately 6·5 pounds of nitrogen in forms available for crop use. Assigning the reasonable figures of 20 cents per pound for the nitrogen, we may conclude that in addition to its primary and all important function of supplying moisture for crop growth, the precipitation supplies per acre annually plant food worth approximately $1.30.

Over 150 samples of well water from farm homesteads have been submitted to complete chemical analysis and reported on as to wholesomeness for family and stock use. This, as in the past, proves to be a useful work and one much appreciated by the intelligent and progressive farmer. The interest in this vital matter of a pure water supply on the farm continues to increase and undoubtedly our work in this connection is having a marked effect throughout the rural parts of the Dominion.

As heretofore help has been afforded farmers in the economical purchase and use of feeding stuffs by the analysis of samples of mill and other feeds sent in for examination. The present high prices for all classes of feeds have resulted in a number of comparatively worthless feeds being put on the market. Analysis is necessary in the majority of cases to determine their nutritive value. More than 200 samples of feeding stuffs have been sent in by farmers for analysis, from which we may conclude that farmers are awake to the assistance that chemistry affords in the economical purchase of these materials.

Satisfactory progress has been made in an investigation towards the utilization of nitre cake in the manufacture of superphosphate. Nitre cake is a waste product in the manufacture of nitric acid, now so largely employed in the preparation of explosives from Chile saltpetre. Though as yet the work has only been conducted on a laboratory scale it promises that this by-product, which at present has practically no commercial value, may be put to a very useful and profitable service in the manufacture of an important fertilizer.

Our work has been continued in connection with the official examination of flours purchased in Canada for the British War Office and civilian supplies overseas. During the year 1668 samples have been analyzed as to water-content.

The routine work for the Meat Inspection Division (Health of Animals Branch) for the year 1917-18 included the examination of 840 samples. These comprised preserved meats and sausages; lards, tallows, oils and butters; dye stuffs and colouring matters, preservatives and pickling solutions, spices and condiments, evaporated apples and canned fruit and vegetables. An additional feature during the past year has been the chemical work necessary to the proper administration of the Oleomargarine Act, this has included, among other matters, the critical examination of 150 samples of butter, fats and oils for added colour.

As required, and in so far as circumstances permitted, analytical work for the several branches of the Department of Agriculture, for the Department of Naval Service, the several commissions and boards connected with munitions and military affairs, the Food Controller's office and the Advisory Council for Scientific and Industrial Research, has been undertaken.

DIVISION OF FIELD HUSBANDRY.

The efforts of the Field Husbandry Division during the past fiscal year were devoted to investigations including soil management, crop management and agricultural engineering. A comprehensive scheme of soil cultural and rotation investigation work is under way on all branch Farms and Stations situated in the Prairie Provinces. On the Eastern and British Columbia Farms and Stations crop rotations are investigated and cultural experiments are being started as circumstances permit. At the Central Farm, Ottawa, the limited area of suitable land which can be devoted to work of this nature precludes the carrying on of several experiments that should naturally be included.

Special attention is given throughout the system to the cost of production of crops, a most important factor in crop management. Data are recorded for the different crops and the extent of the influence which larger manual labour, saving implements exert in lowering the cost of cropping operations is being closely observed.

FIELD CROPS AT THE CENTRAL FARM.

A fairly successful season may be the conclusion drawn from the 1917 results for field crops on the Central Farm. Seeding commenced on April 28 and was completed May 14. Potatoes and root seed were sown towards the middle of May and corn planting was finished by the end of the month. All vegetation made slow growth on account of the cool weather but rapidly improved during the favourable weather in June. The fore part of the haying season was very wet and operations were delayed considerably; however the work was completed during the closing week of July. Grain was harvested and threshed during August and Indian corn was put in the silo during the latter part of September. October was cool and wet with much less sunshine than usual, making fall work tedious. Turnips and mangels were harvested during this month. Fall ploughing was finished early in November and some underdraining was completed.

The yields per acre for the different classes of crop were: hay 2¾ tons, oats 55 bushels, Indian corn 15 tons, and roots 25 tons.

It is gratifying to record that the interest of farmers is aroused to the importance of improved soil and crop methods. This was demonstrated by the fact that the correspondence, in answer to queries of this nature, increased 35 per cent over the previous year.

THE ANIMAL HUSBANDRY DIVISION.

The Animal Husbandry Division of the Experimental Farms has again made marked expansion in the scope of its work during the past fiscal year. The lines of work which fall to this Division are the laying out and superintending of all live stock operations, including the management and housing of farm animals, the manufacturing and marketing of their products, together with all experimental and demonstrational work connected therewith on the Central Experimental Farm, and, in consultation with the Director of the Experimental Farms and the Superintendent of Branch Farms and Stations, the laying out and supervising of similar work on Branch Farms and Stations throughout Canada.

LIVE STOCK ON THE CENTRAL FARM.

The horses on this Farm are all of draught type excepting the necessary drivers and express horses. Amongst the draught horses are a number of excellently bred Clydesdale mares of good type which are used both for general farm work and for breeding purposes. During the past year a number of excellent horse foals were born from these mares. Although in the past difficulties have been met on this and other Farms with the disease termed joint ill, apparently preventive measures are becoming more and more successful. This particular difficulty in horse raising is

being carefully studied by the Health of Animals Branch in conjunction with the Animal Husbandry Division. Feeding experiments both with working horses and breeding stock and the accumulation of data as to the costs of rearing, maintenance and developing of horse power are being continued on this Farm, as well as on the Branch Farms.

Breeding beef cattle are not maintained on this Farm owing to lack of sufficient housing accommodation and pastures. However, during the past year two carloads of choice Western steers purchased on the Winnipeg market were finished in corrals provided for this purpose and, in spite of the peculiar market conditions, abnormal feed costs and the most severe winter on record, these steers finished excellently, were sold at a reasonable margin of profit and commanded the top price on the Montreal market. This demonstration of steer finishing with only a cheap shed and corral for shelter has attracted much attention and favourable comment from Eastern farmers not acquainted with these methods.

The herds of dairy cattle have progressed rapidly during the past year. Excellent representatives may be found of four breeds, namely, Ayrshire, French-Canadian, Holstein, and Jersey, as well as a few choice grades of the Ayrshire and Holstein breeds. In spite of a most unexpected and unexplainable outbreak of tuberculosis in these herds and with accompanying losses, the total number of dairy cattle has increased materially during the past year. The average milk production per cow has again increased largely, and many splendid records have been made by animals of all breeds. Many pure-bred animals from the herds are annually sold for a moderate price, particularly to farmers in districts where the excellence of breeding will be of greatest value. A large number of experiments in the feeding, breeding and handling of dairy cattle have, as usual, been conducted during the past year. An increasing number of experiments with equipment, such as new types of milking machines, have been conducted. A series of experiments dealing particularly with the feeding and rearing of calves has been satisfactorily concluded during the past year, and provision made for the publishing of this data as a bulletin in the near future.

Experimental work along the lines of dairy manufacturing continues to hold a prominent place in the work of this Division, but the expansion of this work experimentally and commercially is largely curtailed by lack of ample accommodation in the dairy. The gross receipts from this department of the Animal Husbandry Division have again increased, and during the past year have exceeded $11,500. From this department, as well as the other departments of this division, a large amount of information relative to production and manufacturing has been distributed, and an increasing number of free forms for the keeping of milk and feed records have been distributed to thousands of Canadian farmers.

The sheep on the Central Experimental Farm have rapidly improved both as to numbers, quality, condition and profits. Only two breeds are maintained, namely Shropshires and Leicesters. However, from these flocks a number of excellent breeding animals have been distributed to Branch Farms and breeders throughout Eastern Canada. A number of experiments in feeding, care and management of sheep have been continued throughout the year. This department has shown a net profit of over $15 per ewe over all feed and labour charges, depreciation, etc.

Swine raising has demonstrated itself as the best paying branch in this Division. Only two breeds are represented in this herd namely, Yorkshires and Berkshires. A large number of pure-bred animals of both sexes have been sold during the year for breeding purposes. A large number of feeding experiments have been conducted both under summer and winter conditions. These experiments have dealt primarily with labour-saving devices and values of home-grown roughages and grains, but have also dealt with various classes of feeds and the best methods of rearing and finishing hogs for market.

During the past year special attention has been paid to a study of all live stock feeds, whether grown or purchased, in order to obtain for immediate distribution information as to the best possible substitutes for standard live stock feeds withdrawn from the markets due to crop shortages or peculiar war conditions. In this experimental work with various classes of stock are used the by-products of terminal elevators, acetone manufacturers, coffee manufacturers and the like, and much valuable information has been distributed to Canadian farmers.

ASSISTANCE TO BRANCH FARMS.

The Dominion Animal Husbandman has visited the Branch Farms and Stations throughout Canada and continued to assist the Superintendents of these Farms. In conjunction with the Superintendents many new lines of live-stock work have been undertaken, but special attention has been paid to increasing the total production on the Farms and the studying of labour-saving devices. To illustrate: there have been installed on six of the Farms during the year, milking machines which have greatly relieved labour shortage. Again, the total hog production on all the Farms and Stations has increased over one hundred per cent, due largely to the use of self-feeding methods.

The Animal Husbandry Division has prepared a large number of plans of buildings for Branch Farms and Stations, some of which have already been approved of and erected by the Department of Public Works, while others are held in abeyance until less necessary construction work may be continued.

MISCELLANEOUS.

The regular correspondence of this Division has again increased enormously over the previous year. Every possible assistance has been given to inquiring farmers along the lines of maintenance of live stock, increasing production, methods of breeding and general management for improved health and increased profits. A most gratifying result of the work in this Division is the ever-increasing interest of the Canadian farmer in improving the convenience and sanitation of his live stock buildings. In this connection, over 500 complete plans of modern farm buildings to suit the individual needs of farmers inquiring, as well as photographs where possible and brief specifications, have been distributed during the past year.

The Dominion Animal Husbandman, as well as the three capable assistants in his Division, have judged at a large number of agricultural fairs and have addressed a large number of meetings throughout Canada, dealing particularly with increased live stock production.

HORTICULTURAL DIVISION.

EFFORTS FOR GREATER FOOD PRODUCTION.

A strong effort was made by the Horticultural Division in 1917 to assist in the movement for greater production of food, particularly of vegetables, and it is believed that much good resulted from the work done. Large numbers of pamphlets were distributed throughout Canada giving simple directions for the preparation of the soil, time and method of planting of the various vegetable crops and the best varieties to grow. Directions and formulæ were given for the protection of the plants from injurious insects and fungous diseases. Demonstrations on vacant lots were also made at various local places by members of the staff of the Horticultural Division to illustrate the best methods.

So great has been the interest in the potato and so important is the crop that a bulletin was published during the latter part of the year giving the results of experiments at the Central and Branch Farms and Stations together with directions for the growing of potatoes based on these experiments and the practice of the best farmers. This bulletin will be available for planting time in 1918 and should prove especially helpful to the thousands of persons who have begun to grow potatoes on small areas.

In order to assist in the preservation of the fruit and vegetables which were grown in 1917, a specialist in domestic science was employed for several months to experiment in methods of canning and drying and to demonstrate the methods found to be the best. Several demonstrations were given during the season, all of which were attended by a large number of persons and, at the Central Canada Exhibition, remarkably large crowds took advantage of the opportunity of seeing how the work was done. A bulletin on Canning, Drying and Storing Vegetables was prepared for the Food Controller, which was published in good time for the canning season of 1917.

Notwithstanding the many other agencies in Canada for disseminating information in regard to gardening, a very large correspondence on this subject was dealt with by the Horticultural Division during the past year.

EXPERIMENTS IN GROWING VEGETABLE SEEDS.

Special attention was again given in 1917 to the production of vegetable seeds, and experiments were undertaken with the more important kinds in order to gain further information in regard to methods of growing them. Good results were again obtained and there is strong evidence to show that home-grown seed produced under the best conditions is as good or better than that obtained from other countries. As there is liable to be a shortage of seed of biennial crops such as carrots, beets and parsnips in 1919, and as the planting of a few roots of each of these will ensure all the seed that the average person requires, a pamphlet entitled "Every Gardener His Own Seed Grower" was published, in which each grower of vegetables was urged to save a few roots from his winter's supply for this purpose. Simple directions for the planting of the roots, the care of the plants and the harvesting of the seed were given. Towards the close of the year, following an Order in Council dealing with the

production of seed, by which growers were guaranteed a minimum price on certain quantities, the Horticultural Division procured seed stocks to supply those growing such seed.

FRUIT CROPS IN THE ORCHARDS AT OTTAWA.

Apples.—Although the crop of apples in the province of Ontario in 1917 was almost a total failure, the crop at the experimental farm, while much smaller than in 1916, was a fair one. Owing to the very cool spring the trees were more than two weeks later in coming into bloom than usual, and the growing season proving a relatively cool one the apples did not mature nor colour as well as in some years. The great advantage of having at least some trees of the hardiest varieties in the orchard was apparent again this year. In unfavourable seasons the hardy sorts are the most reliable. Many of the new varieties originated in the horticultural division continue promising, and some of them will, doubtless, some day take the place of inferior sorts in the trade.

Plums.—There was a medium to good crop of plums this year. A number of the European sorts which usually bear little or no fruit at Ottawa, bore well in 1917. One of the best of these is the Mount Royal, originated on the Island of Montreal. The great dependence, however, for the colder parts of Canada is still in plums derived from the American wild plums, although there is great promise in crosses between these and the Japanese varieties, the Emerald and Omaha being two of the best of such hybrids.

Grapes.—The season of 1917 was not a favourable one for grapes and most varieties under test at Ottawa did not ripen. Various methods of pruning and training are being tried in order to learn by what method ripening will be best assured in unfavourable seasons. A few of the European sorts have proved very early and ripen in lower temperatures than the American. One of the best of these is the Pearl of Casaba.

Small Fruits.—Small fruits succeed well in most parts of Canada and they have received special attention at Ottawa and on the branch farms and stations. Valuable lists of varieties have been published and best methods of growing the different kinds. There was a medium to good crop of all kinds in 1917.

BREEDING OF NEW FRUITS, VEGETABLES AND FLOWERS.

The breeding of new fruits, vegetables and flowers was continued in 1917 and interesting results were obtained from the crossing of previous years. Special attention is being paid, among vegetables, to the production of new and better varieties of beans, corn, peas and tomatoes with especial reference to earliness. Among flowers, the new cross-bred geraniums were, perhaps, the most striking new plants of the year.

ORNAMENTAL GARDENING.

Notwithstanding the war and the main energies of the staff being devoted to economic problems, the grounds have been kept in good condition and notes are being accumulated which will be of value in the future.

BRANCH FARMS AND STATIONS.

The horticultural work on most of the branch farms and stations consists in the testing of varieties and in experiments in different methods of cultivation. At the Kentville station in Nova Scotia spraying experiments have been a marked feature of the work in recent years. The greatest development in horticulture in 1917 was at the newer stations at Morden, Man., and Summerland, B.C., where the plantations were further extended and other work begun. Valuable horticultural data are being obtained at the new stations at Kapuskasing, Ont., and Spirit Lake, Que., although as yet the work is not thoroughly organized there.

The northern sub-stations have furnished valuable information in regard to growing fruits, vegetables and flowers, and this being available to prospective settlers gives them a good idea of what kinds they may hope to grow successfully.

CEREAL DIVISION.

THE SEASON.

Seeding was quite late in most parts of Canada in 1917, and, on this account, cereals, in some sections, did not have the best opportunity of making strong growth. However, conditions were usually favourable during the early part of June. Towards midsummer, crops, over a considerable area in central Canada, began to suffer from drought. This became severe in large sections of Alberta and Saskatchewan, Manitoba, however, was less affected. Some sections of Eastern Canada were troubled by excessive railfall, and in Quebec province there were some disastrous floods.

It is obvious that under such conditions, maximum crops could not be raised. In quality, however, the grain, in most parts of Canada, was good, the wheat from the great Central Provinces being, indeed, of extraordinary high grade, far superior on the whole, to the crops usually produced; so that, while the average yield in Manitoba, Saskatchewan and Alberta was not high, the amount of first-class milling wheat produced was as great as in some seasons when much larger total yields have been harvested. Barley produced a fair yield, except where sown extremely late. Oats suffered a good deal from adverse weather conditions and a shortage of good seed oats in some localities is reported.

VARIETY TESTS.

At Ottawa, very fair yields of cereals were obtained and the tests of varieties gave about normal results. The number of varieties under test has become so large that it has been necessary to reduce the plots to one hundred and twentieth of an acre each, in order not to omit any of the varieties which are being tested. This reduction in the size of the plots has also released a small amount of land for the propagation of especially promising varieties of seed, which is wanted for trial in other parts of Canada.

NEW VARIETIES INTRODUCED.

The Dominion Cerealist has just introduced a new variety of wheat, produced as a result of some of the cross-breeding work which he has been carrying on for many years at Ottawa. This wheat has been named "Ruby, Ottawa 623". It is considered by the Cerealist to be the best variety extant in the extra-early-ripening class. While it is a little later in maturing than Prelude, it is much earlier than Marquis and is expected to prove of very great value in districts where Marquis does not ripen satisfactorily. Ruby produces hard, red kernels and displays those fine qualities in milling and baking for which Canadian wheats are famous. About four hundred samples of this new variety are being distributed to farmers in those districts where it is expected to be most valuable.

Another very interesting cereal, also a cross-bred variety produced by the Dominion Cerealist at Ottawa, has been announced. This is a hulless oat called "Liberty, Ottawa 480". Scarcely any distribution of this has been possible, thus far, but provisions has been made for sending out a number of samples next season. This variety loses its hull when threshed and will, therefore, be of great value for the feeding of young chickens, pigs, etc. Its field characters are also good. While it does not produce as large a yield as the best standard sorts, it is exceptionally early in ripening and has stiffer straw than most other varieties. It may also be mentioned that this oat can be ground for household use in any ordinary small mill and produces, in this way, oatmeal of admirable quality.

FREE DISTRIBUTION OF SEED GRAIN.

A quantity of excellent seed grain for the annual distribution was obtained from the Experimental Farms at Indian Head, Brandon, Cap Rouge, Ste. Anne de la Pocatière, and Ottawa. Several thousand samples of very clean seed of high purity and fine quality are being sent out to farmers in order to give them a start in the growing of those varieties which are most suitable to their particular conditions.

MILLING AND BAKING TESTS.

The milling and baking work was resumed last December on the appointment of a new assistant. Special war problems are being studied, such as substitutes for wheat in bread making, the quality of wheat flours of different percentage extraction, etc. The usual tests of the new, unnamed varieties of wheat grown at Ottawa are also being made in order to eliminate any sorts which show poor bread-making qualities. Some tests of the cooking qualities of peas have also been carried on, in the attempt to find out to what extent variations in quality are due as to varietal differences and to differences in soil and climate.

DIVISION OF BOTANY.

In a commendable spirit of co-operation with the provincial authorities of Quebec and Ontario, it has been possible to carry on the work relating to the white pine blister rust over a much wider territory throughout these provinces. The Forestry services of both provinces placed at our disposal a considerable number of

men who collected evidence on the general distribution of this disease. From the results of these investigations, revealing the wide-spread of this rust on its secondary hosts, the cultivated and wild species of currants and gooseberries, it is feared that the control of the disease within the generally infected area will no longer be possible. This conclusion does not imply, however, that the damage so far done to the white pine resources is considerable; it rather indicates that, since the easiest means of saving the pines is the destruction of the currant, wild or cultivated, the disease now occupies an area of such extent as to render the eradication of these hosts beyond practical possibility.

Work has also been conducted in the laboratories relating to hibernation of the rust on currants, the longevity of the spores on currant and pine, the distance they are carried by the wind, and other phases which would prove useful in the ultimate establishment of certain areas in which methods for systematic control may be tried.

The necessity for increased crop production has also resulted in increased attention being paid to the control of plant diseases. In this connection, work was commenced during the year in the new western field laboratories, which are devoted to the study and control of diseases affecting grain. Grain rust causes annually considerable losses, and as yet very little is known of control measures to exert any influence over this destructive disease. There exist, however, certain factors which favour a rust outbreak, such as late seeding, the use of late varieties, unsuitable soils, the presence of the shrub barberry, and the use of inferior seed grain generally. Attention has been paid to these points in advising farmers. Luckily, the losses from rust were not severe during the year.

The potato crop, a food crop next in importance to grain in Canada, is also subject to a large number of diseases which reduce the yield or induce rotting in storage, and thus cause considerable losses of valuable food material. For several seasons past it has been demonstrated to the farmers in the Maritime Provinces that by spraying and other precautionary measures, the yield of potatoes may be profitably increased. This season similar investigations were commenced in Ontario, where much interest was taken in this work. The improvement of the potato industry largely depends upon the speedy and successful elimination of several specific diseases, such as leaf roll and mosaic, which account for more than the usual share of losses due to disease. The seed and field inspection carried on in this connection, it is hoped, will soon produce more widely beneficial results, such as have been obtained through extensive experiments.

The Central laboratory, in numerous instances, gave advice to farmers and fruit growers *re* the control of specific diseases affecting crops throughout the Dominion.

Nitro-cultures were again prepared in the laboratory, and distributed free of charge in order to give as much encouragement to the growing of peas, clovers, and alfalfa as possible. The beneficial results obtained by cultures of these nitrogen-fixing bacteria were in some instances remarkable.

A considerable number of plants were identified; increased interest is being manifested in the cultivation of medicinal plants. Several kinds of fibre plants have been tested in a small way to determine whether their introduction would likely prove of economic value.

Several plots of castor oil beans were under cultivation. The oil is greatly in demand, since it seems the most suitable to withstand the great friction caused by aeroplane motors. It is doubtful whether this crop will prove of value in the Dominion as far north as Ottawa, although ripe beans were harvested.

The field laboratory at St. Catharines devoted as much time as possible to the study and control of fruit diseases. It appears that means have now been discovered for the control of peach canker, which causes considerable damage in the orchards. The manuscript for a pamphlet on tomato diseases was also prepared during the year.

The field laboratory at Fredericton reports progress in the study of potato diseases. Also, experiments were conducted relating to the control of club root.

The field laboratory at Charlottetown continued its work on leaf roll and improvement of Garnet Chili potatoes for export to Bermuda. In Nova Scotia, experiments with dusting compound for the control of apple scab were carried on.

The prairie field stations at Brandon, Man., and Indian Head, Sask., commenced work on grain diseases. In this connection may be mentioned a conference called under Dominion auspices, dealing with the organization of co-operative work on grain rust.

The divisional quarters were transferred to new offices in a remodelled building where ample accommodation will be found for some years.

Officers of the Division attended a number of conferences on white pine blister rust, on potato improvement, and the division was also represented at the annual meeting of the American Association.

To aid the campaign of greater production, a number of timely press notices were prepared.

THE DIVISION OF FORAGE PLANTS.

VARIETY TESTS.

As usual, a number of varieties of field roots and Indian corn were tested, including 31 varieties of mangels, 48 varieties of swede turnips, 13 varieties of fall turnips, 14 varieties of carrots, 3 varieties of sugar beets, and 20 varieties of Indian corn.

The yields of all root varieties were comparatively low and, on account of lack of uniformity which was more or less noticeable in practically all varieties, definite conclusions with regard to the comparative yielding capacity of the different varieties can hardly be drawn from the results obtained this year. The lack of uniformity was especially pronounced in the mangel varieties which on the whole were so badly off type that the yields secured are practically useless as indications of the yielding capacity of the true varieties which, according to the names given, were supposed to be tested.

BREEDING.

The past year was, on the whole, unfavourable for breeding work and as, on account of the increasing scarcity in the field-root seed supply, special work had to be started to relieve the root seed situation, at a time of the summer when much

of the breeding work should have taken place, the breeding work was not pursued to the extent that under normal conditions would have been possible. However, a certain amount of breeding work was carried on, including continuation of the work with those grasses and clovers that have been worked within the last few years, and also including starting of breeding work with meadow fescue through isolation and self-fertilization of a number of specially selected types.

ROOT SEED GROWING A SUCCESS.

Several years' experience with root seed growing at the Central Experimental Farm, Ottawa, has demonstrated, beyond any doubt, that field-root seed can be grown very successfully in the Ottawa district. Large yields of mangel, swede turnip and carrot seed of excellent quality have been secured the last few years and, as far as the Ottawa district is concerned, root seed raising is beginning to pass the experimental stage.

It is thus well known that seed of first-class quality can be grown in the district, but nothing has been done to ascertain the cultural and soil conditions under which heaviest possible yields may be realized until recently.

In 1915 an experiment with planting mangels for seed was conducted. As the results indicated that the date of planting to a very considerable extent seemed to influence the quantities of seed produced, the experiment was repeated. According to our experience, the heaviest seed crops are realized when the roots planted for seed raising are set out as early in the spring as possible.

In 1915 another experiment was also started on a small scale, with a view of furnishing some preliminary data on the effect of manure and various fertilizer mixtures on root seed yields. The results of the same indicated that a heavy dressing of manure or an application of a complete fertilizer very much increased the seed yield.

In 1917 this fertilizer experiment was somewhat elaborated, different rates and combinations of artificial fertilizers being applied without manure, and also with manure at different rates. The results indicate that the heaviest seed yields may be obtained if the land is heavily manured and, in addition, is given a liberal application of a complete fertilizer.

The two chief factors that thus seem to be most essential for the realization of heavy seed crops are therefore, according to our experience, early planting and high fertility of the soil.

GRASS AND CLOVER SEED RAISING.

So far, all the seed of grasses and clovers, including alfalfa, that is produced in Canada, is harvested from fields seeded down in the manner in vogue for hay crops. In other words, seed crops are taken from ordinary hay fields allowed to go to seed. This practice allows the farmer to decide whether, under certain conditions, it would be more advantageous to harvest a hay crop or whether it would be to greater advantage to harvest a seed crop. So far, grass and clover growing for seed exclusively, is practically unknown in Canada.

In 1916 an experiment was started for the purpose of ascertaining the best methods for profitable grass and clover seed raising. The results, as secured this year, indicate that so-called row seeding yields far heavier seed crops than ordinary broadcast seeding. In addition, a much cleaner seed crop is realized.

EMERGENCY ROOT SEED RAISING.

Owing to the prospective shortage in the field-root seed supply in the immediate future, the experimental farms were requested, about the middle of the summer, to arrange for seeding of considerable areas to stecklings to be used for seed raising in 1918. Accordingly, seed of the best varieties of mangels, swede turnips, and carrots then available was secured and distributed to a number of stations. On account of the late seeding, however, and also on account of the extremely unfavourable harvesting conditions in the late fall, the steckling crops secured were not in such a good condition for wintering as would have been the case under normal conditions. As a result, the areas planted to seed in 1918 will not be as large as estimated when the steckling areas were planned for.

BEE DIVISION.

Bees are now kept at sixteen of the experimental farms.

In the summer of 1917 the apiarist continued his survey of Canada, for favourable regions for abundant honey production, visiting among other places, the Rainy River and Kenora districts in Ontario and the Lake St. John district in Quebec.

Co-operative experiments with experienced bee-keepers in typical localities for honey production were conducted and extended. These included East Royalty, P.E.I., Gaspereau, N.S., Amherst, N.S., Louiseville, Que., Montcerf, Que., Lytton, Que., Athens, Ont., Thornloe, Ont., Clandeboye, Man., and Medicine Hat, Alta. All these places except East Royalty and Athens were visited by the apiarist in the summer of 1917. Much valuable information is being obtained from this work.

Experiments with fireweed (*Epilobium angustifolium*), the most promising honey plant for commercial bee-keeping at altitudes and latitudes higher than those at which clover gives best results, have been started.

Experiments in importing young bees without combs in spring, from the Southern States were continued at Ottawa, and it was found that two-pound lots received on May 9, about a week before the commencement of the dandelion honey flow, costing $3.66 each, including express charges, after being supplied with empty combs produced about as much surplus honey as the regular wintered colonies.

Experiments having for their object the reduction of labour in the control of swarming and reduction in the mortality of bees during winter, the two principal problems in bee management in Canada, have been continued. Small out apiaries were again maintained at Kazubazua and Sully, Que.

An attractive and inexpensive container for granulated honey that had been devised at the Central Experimental Farm to meet the increased cost and scarcity of tin containers was further developed and used for a part of the 1917 honey crop produced there, with satisfactory results.

The growing importance of honey as a food and the considerably higher prices it has commanded since the summer of 1917 have brought an increased number of inquiries about bee-keeping and there has been a heavy demand for the literature on the care of bees issued by this division. Articles on bee-keeping, showing how honey production may be increased, etc., have been prepared and have been published in the bee-keeping and general press.

POULTRY DIVISION.

The work of the Poultry Division during the past year has been progressing very satisfactorily, though, owing to lack of accommodation, efforts along several lines of investigation have been considerably curtailed.

CENTRAL PLANT.

At the central plant, good results were obtained in the breeding work and an excellent crop of young stock was raised. The pullets went into winter quarters more fully matured and in better shape generally than usual, with the result of an improved winter egg yield.

The pedigree work has advanced to such an extent that for the first time it has been possible to supply Branch Farms with all cockerels from high-producing mothers. These cockerels were of an exceptionally good type and constitution, and should do much to improve the laying qualities of next years' pullets. It is expected that from these cockerels the Branch Farms will have a considerable number of breeding males to dispose of to farmers next fall.

It was found necessary to discontinue practically all of the turkey and waterfowl experiments on the central plant. Just a few breeding stock being retained. At Invermere, B.C., the turkey crop was as large as usual and investigations there show that so far the ravages of Black Head are not present.

BRANCH FARMS.

At most of the Branch Farms the year's work was satisfactory, though because of frequent changes in poultrymen it was difficult to obtain the best results in every case. During the year no less than eight changes were made among the poultrymen. Some of these through enlistment, others because we were unable to retain them.

Three new Farms were added during the year, Summerland, B.C., Scott, Sask., and Lennoxville, Que. One breed only will be kept at Summerland, White Wyandottes. At Scott, Barred Plymouth Rocks. At Lennoxville the Rocks will also be installed when the stock is obtained this summer. Winter came on before the buildings were completed here and operations will not commence until next season.

EXPERIMENTAL WORK.

Among the experimental work concerning which more data has been obtained and upon which greater emphasis is being placed are, the importance of the male to

obtain high egg yield; the value of early pullets for winter egg production; the unprofitableness of late pullets as a business proposition; the value of vigour in the breeding stock; light in the laying pen during the short days; war time rations; vegetable vs. animal protein, etc.

Further experience was gained in feeding buckwheat screenings at the Central Farm and at the Maritime Farms. For the rearing of chicks it is a valuable and cheap feed, but as a scratch feed for winter use it is not suitable, though it does make a suitable mash feed when ground. Owing to the presence of weed seeds it is better to be always ground before feeding.

POULTRY DISEASE INVESTIGATIONS.

During the year, Dr. A. B. Wickware, Pathologist in charge of Poultry Diseases, has conducted investigations in a number of poultry diseases, and has been of great help in the work.

EXTENSION.

The survey work conducted in Quebec is still proving a valuable department of extension work. Another department of this work has been started in the sending out of copies of a "Farm Egg and Poultry Account" blank. Duplicate copies of these are returned to the office each month, and to each copy a reply is given pointing out how improvements can be made in the management. Valuable data are received by this Division of actual farm conditions and suggestions are offered that will be helpful to the producers.

A WAR TIME INDUSTRY.

In spite of the high price of feed, there is more inquiry for information and for stock and eggs this year than ever. Though the total number of poultry kept may not be increased there is no doubt that the high cost of everything is tending to make producers put their plants on a business basis. The non-producers in the flock are being eliminated, more poultry keepers are keeping accounts, farm poultry plants are being renovated. The back-yard flocks are increasing, and though this year, too, many suburban families started out with immature pullets, those who had suitable birds have found that it is possible to produce eggs at a profit, and that table scraps that might otherwise go to waste can be turned into the very best of human food In spite of the fact that no special propaganda for greater production of poultry has been conducted, the indications are that there will be an increased production brought about more by increased efficiency than increased numbers.

THE TOBACCO DIVISION.

Despite an unfavourable season, the tobacco crop of 1917 was better than that of the preceding year.

In Quebec, considerable damage was caused by floods, storms, and hail. Generally speaking, tobaccos did not ripen well, the excessive rainfall prolonging the growing period unduly. The weather, moreover, was not hot enough to permit of normal

ripening and a larger proportion than usual of thin leaves was obtained, thus lessening the weight of the crop. On the other hand, the percentage of leaves suitable for use as cigar binders was markedly increased.

In Ontario the production of flue-cured tobaccos is rapidly increasing. The quality and colour of these were better than in 1916. This was also true of the White Burleys. They ripened better than in the previous year, the harvest dried better and the colour was clearer.

The shortage of tobaccos resulted in a considerable rise in prices. Binder tobaccos in Quebec sold at about 30 cents a pound. White Burleys in Ontario commanded over 20 cents while the flue-cured tobaccos ran from 30 to 40 cents a pound.

The market for Canadian-grown tobaccos was very active, many manufacturers either trying them for the first time or greatly increasing their use.

At the Harrow Tobacco Station conditions permitted of more accurate experimental work in 1917. The value of fall ploughing was demonstrated, both as to economizing labour and also in increasing crop returns and destroying the grey worm.

The use of arsenate of lead at transplanting time was shown to give better results than did Paris green.

The experiments with commercial fertilizers have given results definite enough to permit of the preparation of a formula for these.

The use of Canadian-grown seed is proving more and more to be recommended. The resulting crop is heavier and more uniform and earlier-maturing. About 51 pounds of tobacco seed was produced at Harrow last year.

On the Farnham, Que., Station the Zimmer Spanish, Big Ohio, X Sumatra, and the Yamaska were the varieties grown. The first gave almost an average crop; the other two were in great part destroyed by floods and hail.

A study of the temperatures in the hot-beds shows that the best results are obtained where the temperature in the lower part of the bed is the highest. The cold frames, even under glass, are being regarded with increasing disfavour.

The crop of Zimmer Spanish on the Tobacco Station at St. Jacques l'Achigan, Que., was an average one, fairly well matured but the leaves were very thin and would class as "wrappers" rather than "binders" although the latter had been the class aimed at in growing this variety.

The average loss from plant diseases was about the same as in 1916. There was more damage from mosaic disease but less from tobacco root rot.

The study of the changes occurring in acclimatized varieties was continued at Ottawa and Harrow.

Satisfactory results in producing tobacco suitable for cigar binders, were obtained with a longleaved variety of Obourg and also with Zimmer Spanish. A suitable method of treating this class of tobacco was worked out. It was shown that the Yamaska and Canadian Aurora, may be used as cigar "binders."

During the summer an improved curing barn was built at Farnham, the chief modification made being in the system of ventilation.

DIVISION OF ILLUSTRATION STATIONS.

The third year of the Illustration Station work has shown the value of crop rotations and good cultural methods.

In Saskatchewan and Alberta, during the dry spell in 1917, crops on the Illustration Stations withstood the drought better and gave higher yields than did the average crops in the district in which the stations are located.

The following rotations are being carried on in Alberta and Saskatchewan: –

Wheat continuously.
Wheat, summer-fallow alternately.
Summer-fallow, wheat, oats.
Corn, wheat alternately.
Western rye grass and alfalfa.

Wheat grown continuously has shown a decrease of 10 bushels per acre, and an increase of weed growth.

Wheat after summer-fallow yielded 10 bushels per acre more than wheat grown continuously and the fields are kept free from weeds and in a good state of cultivation.

Wheat on the three-year rotation gave a yield of 4 bushels per acre more than the average of the district. Oats on this rotation did not yield as high as those grown on fallowed land.

Wheat after corn was grown to see if corn could be profitably grown and how much summer-fallow could be eliminated.

Wheat after corn has yielded from 2 to 4 bushels less than after the summer-fallow.

Corn growing in some cases has been successful while in others the frost comes too early, before the plants are fully grown.

Western rye grass and alfalfa have given good results as fodder crops and several operators are making a success of growing seed. Western rye grass has yielded as high as 800 pounds per acre and alfalfa 125 pounds per acre.

Farmers are taking the opportunity to purchase this seed at a reasonable price from the operators of the Illustration Stations, and no difficulty is found in getting sale for all that is grown.

Wheat and oats are also grown for seed purposes. Farmers operating the stations are allowed to reserve a certain quantity for their own seeding, the balance of the seed being sold to farmers of the neighbourhood.

VISITS.

During the season each Illustration Station was visited at least once each month by the inspector in charge of the work in the province, and at least once during the season by the supervisor.

The object of these visits is to instruct the operators as to the best methods of cultivation and to give advice on general farm work.

Farms in the vicinity of the stations are also visited and general farm problems are discussed.

MEETINGS.

During the year meetings were held on the illustration fields. Farmers and others interested in farm work were notified and much interest was shown by them in examining the crops and having the methods of cultivation explained to them. Meetings were also held during the winter at many places where the stations are located.

In addition to the illustration work with crops, the operators were supplied with settings of eggs from the Experimental Farms and with garden seeds. Much interest was shown in both these lines of work by the farmers in the districts of the stations and many of them have now pure-bred flocks and better gardens.

DIVISION OF ECONOMIC FIBRE PRODUCTION.

Experimental plots have been grown in the various districts in Canada with a view to determine the areas that are suitable for the production of flax fibre. The crop from these plots have been shipped to Ottawa and retted and scutched in the fully equipped flax mill at the Central Farm. Fibre of first-class quality has been obtained from the western part of British Columbia, southwestern Ontario, the valley of the St. Lawrence, and the Maritime Provinces. An exhibit of flax fibre and products prepared by the Experimental Farm won a gold medal at the Toronto Exhibition last year.

Special attention has been given to the production of a practical flax harvester, and it is hoped that such a machine will be on the market this season. The prairie flax straw piles may possibly become a valuable asset as a serviceable straw board can be made from the flax straw now going to waste. A sort of straw lumber can also be produced suitable for walls and partitions in houses at about $6 a ton. Investigations into the making of linen are in progress, but have not yet advanced far enough to give much encouragement. In the way of paper making, however, it is said to be a great future for flax straw, and the experiments will continue till definite results have been secured.

DIVISION OF EXTENSION AND PUBLICITY.

The work of the division embraces the—

1. Preparation and staging of exhibits of the Experimental Farms at fairs, exhibitions, winter fairs, poultry shows, and seed fairs.

2. Enlarging the mailing list of publications issued by the Department of Agriculture.

3. The distribution of exhibition circulars.

No exhibition work was done by the Brandon Farm last season owing to the loss by fire of all exhibition material.

The exhibit from the branch farms attended 117 fairs and exhibitions during the year and exhibits from the Central Farm were sent to twenty-nine.

New exhibits and models were furnished to all the branch farms, except Brandon, and were built in five different designs; these will be moved on from one Experimental Farm to another after being used once at each fair in the district.

Every effort is being made to give the exhibition work of the division a greater educational value to the farmer, and at the same time bring to the attention of the public generally the work being undertaken and carried out by the Experimental Farms.

The mailing list has been increased by the addition of 15,709 names, of this 13,739 were English and 1,970 French.

HEALTH OF ANIMALS BRANCH.

This very important branch is maintained for the purpose of safeguarding our live-stock interests, as well as our export trade in meat and canned food products.

Although the conservation of these interests is always a matter of importance, it is now, owing to war conditions a vital question and an imperative duty.

Provision is made under the Animal Contagious Diseases Act for the enforcement of suitable measures to guard against the introduction of diseases from outside sources, and also to control and eradicate certain dangerous contagious diseases within our boundaries by compulsory slaughter methods with compensation.

In order to adequately prevent the importation of diseased stock, shipments of animals are only permitted to enter this country at certain recognized inspection ports and quarantine stations, which are suitably located at points along the International Boundary, and the Atlantic and Pacific seaboards. Veterinary inspectors are stationed at, or in close proximity to these points, for the sole purpose of inspecting all shipments of stock presented for entry. It is their duty to take whatever measures they consider necessary to satisfy themselves that the animals are free from contagious disease before permitting entry. As a further safeguard the Regulations require that American shipments are accompanied by certificates signed by veterinary officers of the Federal Bureau of Animal Industry, stating that the district from which these animals originate is free from certain dangerous contagious and infectious diseases.

In this connection I may say that the hearty co-operation of the American authorities is of very material assistance in the enforcement of our regulations governing the importation of animals from that country. The certificates of their officers are always reliable, and they are ever ready to notify my officers in case a diseased animal is suspected to have been shipped to a point in this country.

Overseas importations, with the exception of horses, are not permitted unless the importer first obtains a permit from my office. They must also be accompanied by certificates signed by an officer of the Board of Agriculture and Fisheries, certifying that no serious contagious disease of animals has existed in the district from which they originated. Upon arrival at the Canadian seaboard, the animals are carefully inspected, and if no evidence of disease is found cattle, sheep and swine are admitted into the quarantine station, where they are detained for further observation, before being permitted to come in contact with Canadian stock. The cattle are held for thirty days, counting from their entry into quarantine, and tested with tuberculin. The sheep and swine are held for thirty days, counting from the date of the sailing

of the vessel from the port of embarkation. The horse importations are carefully inspected, and if no evidence of disease is found they are allowed to proceed to destination. These shipments consist almost entirely of valuable pure-bred animals, and as they are seldom exposed to infection, it has not so far been considered necessary to detain them, or submit them to a mallein test.

The control of disease within our boundaries is carried out by means of an organized field staff, consisting of a chief veterinary inspector for each western province, with a head office and clerical staff. The work in each province is directed by this officer under the supervision of the Veterinary Director General, at Ottawa, who also directs this work in the east.

There has very fortunately been no extensive outbreak of disease during the past fiscal period. The outbreaks which have occurred have been dealt with expeditiously, and with the least possible loss not only to the owners, but also to my department. The field staff has, however, been working under strength, owing to the fact that twenty-one of its members are on active service.

As the danger of the introduction of diseases foreign to this country will be very real after peace is declared and our fighting forces return, it is a matter of vital importance to maintain the field division at the utmost efficiency, in order that any epizootic may be promptly controlled and eradicated.

The statistics for the period under consideration are fully outlined in the report of the Veterinary Director General, and it is, therefore, only necessary for me to deal with the work of this branch in a general way.

GLANDERS.

The eradication of glanders is still giving my officers considerable trouble in the province of Saskatchewan. This disease has existed for many years in this province and at one time was a very serious menace to the horse industry. There has not been an increase in the number of horses slaughtered in Saskatchewan during this fiscal period, but the fact that practically the same number has been destroyed as in the previous year would indicate that the infection still exists to a dangerous extent. As, however, the outbreaks have been more or less limited, it should be possible to eradicate this disease in the near future.

The situation appears to have improved considerably in Alberta, as the number of cases found in that province during this period has materially decreased.

This serious disease of horses has fortunately not been detected in any of the other provinces, with the exception of Quebec, in which province a small outbreak occurred but was promptly eradicated.

The mallein used for the detection of this disease is all manufactured at the biological laboratory here, and the same precautionary measures have been taken with regard to horses imported from other countries. Those coming from the United States, if accompanied by a satisfactory mallein test chart, signed or endorsed by a Bureau officer, are held at the boundary port and submitted to the mallein test there by a veterinary inspector of the Health of Animals Branch. Reacting horses are either destroyed without compensation or returned to the United States, and the American authorities notified.

DOURINE.

Considerable progress has been made in dealing with this disease in Saskatchewan and Alberta, these being practically the only two provinces in which it has been dealt with. The few cases which have been found during the past year have all occurred in old infected centres. In view, however, of the deceptive nature of this disease, it is still necessary to exercise great caution before removing any quarantine measures from infected premises.

Owing to certain researches, which were conducted by one of the pathologists at the Lethbridge Quarantine Station, it has been possible in recent years to arrive at a definite decision as to whether or not an animal is actually affected with this disease, even though it may appear to be in perfect health. This means of diagnosis has enabled the department to deal very successfully with this disease, and will no doubt enable it to eradicate dourine in this country in the very near future. The disease has, however, been practically eradicated in Saskatchewan, as there was only one case slaughtered in that province during the period in question, although a very large number of serum tests were made.

It has been the custom of my officers to make systematic collections of blood from all breeding stock in the old infected centres, as well as in the territory surrounding these centres. While this entails a great deal of work, it is nevertheless a very necessary procedure. A few cases which were detected by this means, if unobserved, would have been the means of causing a very serious outbreak, resulting in very serious losses to our horse-breeding industry.

HOG CHOLERA

British Columbia is the only province in which hog cholera has not been detected during the fiscal period just past. There were, however, only a very few outbreaks in the provinces of Manitoba, Saskatchewan, and New Brunswick. The disease has, as in the past, been more prevalent in Ontario, but the outbreaks have not been nearly as numerous as those dealt with last year. In the province of Quebec, also, fewer outbreaks have occurred.

The increased activity in the shipment of hogs from all parts of Alberta to the large packing-houses in this country, has resulted in a dissemination of the disease in that province. A number of outbreaks were dealt with in some of the large stock yards, and these were eradicated without any serious further extension of the disease.

There has always been a tendency for outbreaks of this kind to occur whenever large shipments of hogs are brought together from outlying districts. This is no doubt due to the fact that immune carriers of the disease come in contact with susceptible hogs from entirely different districts, resulting in the latter becoming infected.

The compulsory slaughter and compensation policy is still followed in controlling this highly infectious disease of hogs. During the last few years, however, the department has used serum as a protective measure, and although the manufacture, importation, sale or use of hog cholera virus and serum is prohibited under the Quarantine regulations, the department has found it advisable to import a limited

quantity of the virus and a much larger quantity of the serum, the former for experimental purposes and the latter for economic reasons.

The hog cholera virus, containing, as it does, the active organisms of the disease, must be handled with the greatest of care. The virus is at present being used only on one premises in this country. These premises are under quarantine and the immunization of the hogs is carried on under strict official supervision. No hogs are allowed to be removed from these premises until a special license has been issued by one of my officers. Although this experiment has been going on for a few years, no outbreak of disease has occurred from this source. Although this procedure may be satisfactory in isolated instances, it is not at all likely that it would be practicable or safe if used in a general way in this country. The hog cholera serum does not contain the causative agent of the disease, but produces an immunity for a temporary period, when inoculated into susceptible hogs, and is, therefore, valuable for the protection of exposed hogs during a dangerous period.

Approximately 290,000 c.c. of this serum have been used by my officers in protecting 8,000 exposed hogs during the past year.

The Veterinary Director General is of the opinion that the use of serum has saved for food purposes a large number of carcases of hogs, which under other conditions would have been destroyed. It would also appear that the use of serum with exposed hogs has resulted in a decrease in the number of premises on which the disease has actually been found. In view of the fact, however, that the serum gives only temporary immunity it has been our policy to have all treated exposed hogs prepared for the block as soon as possible and disposed of in this way.

Practically all of the outbreaks of hog cholera during the period in question have been traced to the feeding of garbage, and in view of the danger of infection from this source, it has been necessary to control as far as practicable the feeding of this material. The regulations now require that persons feeding garbage to hogs on premises other than those on which it is produced, obtain a special license from the Veterinary Director General, and a penalty is provided for those who fail to comply with this requirement.

The statistics in the report of the Veterinary Director General show that practically one-half of the outbreaks of hog cholera during the period in question were dealt with in Ontario, and there is no doubt that the principal source of infection in this province comes from American pork scraps fed to hogs in the garbage, as American pork products are consumed by our people to a much larger extent in Ontario than in any other province in Canada.

In view of the importance of increasing our hog production to the greatest possible extent, it is imperative that adequate measures are taken to prevent the serious losses sustained from outbreaks of this disease. The outbreaks of this disease which do occur throughout this country are regularly and systematically eradicated, and it would, therefore, appear that the Department would not, in view of these conditions, be justified in using the simultaneous method for immunization, as this would entail the introduction of the virus into many thousand hogs, and would establish a permanent infection throughout this country.

ANTHRAX.

This very serious fatal malady of man and all domestic animals has fortunately been detected on only four premises throughout Canada during the fiscal period under consideration. The disease was in each case found on old-infected premises in the provinces of Ontario and Quebec. Prompt measures were taken for the immunization of all contact stock on the infected premises, as well as on adjoining farms, with the result that an extension of these outbreaks did not occur.

Anthrax vaccine is manufactured at the biological laboratory here and is supplied to veterinarians at cost price, but this vaccine is not sent out in a new outbreak until the veterinary inspector's diagnosis has been confirmed by microscopic examination of the blood.

RABIES.

No serious outbreak of this disease has been dealt with for some years in Canada. This is a very important disease when looked upon from a public health standpoint, owing to the fact that the malady is easily transmitted to the human being through the bites of rabid animals.

The policy followed in dealing with this disease is to quarantine premises on which suspected cases have occurred. All dogs on these premises are securely chained or muzzled, and any other bitten animals are securely detained. These restrictions are enforced until a satisfactory period has expired to satisfy the department that infection has been destroyed.

Although there were a large number of animals examined on suspicion in Ontario, the department was only able to confirm the diagnosis of rabies in a very few cases.

MANGE IN CATTLE AND HORSES.

There has been a marked improvement with regard to this disease during the fiscal year just past.

Mange in horses has not for many years existed to a serious extent in this country, and it is very gratifying to state that in the twelve months just ended my officers have only found thirty-one horses actually infected with this malady throughout Canada. Most of these cases were dealt with in Saskatchewan, and there is no doubt a number of them were due to infection brought in from the south.

It is not always possible, even with the most careful examination, to detect an animal harbouring the mange mite, but not showing any symptoms of skin trouble. The large number of settler's horses and others imported for commercial purposes coming into the western provinces make this source of infection a most real one, and although all possible measures are taken to prohibit the importation of affected animals, some undetected cases are possibly imported.

Although the mange parasite of cattle is more easily destroyed than the one producing mange in the horse, the department has for many years experienced a great deal of difficulty in controlling this disease in cattle on the western ranges. This is no doubt due to the fact that the infection of mange exists on the open range.

Although many years ago the control of this disease caused the department a great deal of anxiety and trouble, the situation has during the last few years improved very

materially. The large area covered by special restrictions, controlling and limiting the movement of all cattle in and out of that area, has been gradually reduced. It has, however, not been possible to remove any of the restrictions from any part of this area during the past year. There is no doubt, however, that if the same progress is made in the future, the department will soon be justified in releasing portions of this area from the restrictions which cause so much inconvenience, and in many instances serious annoyance to the shipper. In view, however, of the necessity of controlling this disease it is necessary to exercise caution.

The infected area is carefully ridden by experienced range riders and all herds carefully inspected in a systematic manner. Any herds, in which the disease is found or suspected, are specially quarantined and treated under official supervision, and all possible measures are taken to prevent the movement of any infected or exposed stock to points outside this area, or to points in the area where the infection has been eradicated.

It has been possible for our officers to keep in closer touch with the existing conditions, owing to the fact that the infected area is much smaller than in former years. It is, therefore, gratifying to be able to report that with a closer supervision over all herds in this area, my officers were only able to find half the number of cases reported in the previous year, when they had a larger territory to cover. This would indicate that if energetic measures are followed in the infected territory, there is every possibility of eradicating this disease in the near future.

SHEEP SCAB.

This disease has been practically eradicated in this country. There were only five cases of sheep scab dealt with in Canada during the past year and these cases were all found in an outlying district in Manitoba, where an outbreak had been dealt with a few years ago.

In view of the troublesome nature of this malady it is necessary to enforce regulations for the purpose of preventing the possibility of the importation of infected animals. Owing to the desirability of encouraging the importation of large flocks of sheep for our western provinces, where we have good grazing areas for these animals, it was considered advisable to amend the Sheep Order so as to permit the importation of sheep from the states of Washington, North Dakota, Montana, Idaho, and Wyoming, without dipping or quarantine at the international boundary.

In order, however, to safeguard our interests, importation from the above-mentioned states must be accompanied by a certificate signed by an officer of the Bureau of Animal Industry, stating that the sheep have been inspected within the thirty days prior to their arrival at the international boundary, and that they have been found to be free from scab and necrobacillosis, and that these diseases do not exist in the county or counties in which the sheep originated.

Shipments accompanied by this certificate are carefully inspected by the Canadian veterinary officer and if no signs of disease are detected are permitted to proceed to destination.

BOVINE TUBERCULOSIS.

The control of this disease has been a question of serious consideration by all authoritative bodies for many years and although it exists in all civilized countries to an alarming extent, the nature of the disease and the tremendous economic losses which would result from compulsory measures, have prevented the taking of any drastic measures.

The question is a very serious one and attended by very many difficulties. These are of such a nature that even in normal times authorities have hesitated to enforce measures which are considered suitable for its proper control. The fact will, therefore, be appreciated that under war conditions extreme caution must be exercised in dealing with a matter of this kind.

While the department is only too anxious to be of assistance in every possible way in the suppression of this disease, the necessity of utilizing every possible form of food which can be rendered wholesome, makes it imperative to even exercise caution in promulgating measures for the control of dangerous infectious diseases in food-producing animals. No changes have been made in the policy which has recently been followed in dealing with this disease.

Compulsory slaughter of affected animals is only followed in connection with municipal licensed dairy herds under the Tuberculosis Order. This order has been in force nearly four years, and up to the present time the only cities in Canada which have taken advantage of this order are Saskatoon, Regina, North Battleford, and Ottawa.

During the past year there have been approximately 7,000 cattle tested in the dairies supplying milk to these cities, and approximately 4¼ per cent of these animals were found to be tuberculous. The department paid approximately $9,000 in compensation, and the owners realized in addition to the compensation approximately $5,000 for the carcasses which were passed as fit for food. Out of three hundred and three reactors, twenty-eight carcasses were condemned, for which the owners received the amount of compensation awarded by the department and in addition thereto the amount realized from the sale of the hides and the value of the carcasses as an inedible product. It is, therefore, quite evident that if municipalities would take advantage of the assistance offered by this department under the Tuberculosis Order, good progress could be made in controlling tuberculosis in dairy herds with the least possible loss to all concerned.

FOXES.

The order necessitating the inspection and quarantining of all foxes imported to Prince Edward Island is still being carefully enforced and has doubtless resulted in the desired protection from communicable diseases among foxes on the island.

The imported animals are quarantined for thirty days on the site provided by the provincial authorities, where they are examined carefully and kept under the supervision of the veterinary officer. Twenty-five imported foxes were quarantined during the last fiscal period but no disease was detected.

INSPECTION OF CARS AND YARDS.

In view of the necessity of maintaining a close supervision over stock cars and yards for the purpose of enforcing systematic and effective disinfection of all premises through which live stock pass during their transportation from one part of this country to another, an adequate force of inspectors is maintained at suitable points.

LABORATORIES.

There are three laboratories maintained by this department. The biological laboratory is located at the Central Experimental Farm, Ottawa. At this laboratory, anthrax and blackleg vaccines are manufactured for distribution at cost. The mallein used in testing horses for glanders, and the tuberculin for testing cattle for tuberculosis are also manufactured here. There are also many thousand specimens examined microscopically for diagnostic purposes, as well as many specimens for confirmation of diagnoses made by inspectors in the abattoirs working under the provisions of the Meat and Canned Foods Act.

One of the pathologists at this laboratory has been devoting a great deal of his time to conducting research experiments in connection with contagious abortion, and another is giving his attention to researches in connection with diseases of poultry.

A research laboratory is maintained at Lethbridge, and another one at Agassiz. The work in the laboratory at the former point is limited largely to the examination of serum for the diagnosis of dourine, while the pathologist stationed at Agassiz is engaged chiefly in investigating the life-history of certain parasites and the investigation of plant poisoning of animals peculiar to British Columbia. The veterinarians at these two laboratories have also examined microscopically specimens forwarded to them for diagnostic purposes by stock owners, as well as those sent by the Meat Inspectors.

The work in these laboratories varies from time to time, as it is necessary to devote special attention to ascertaining certain facts with regard to any disease which may occur, and cause serious fatalities among live stock. The maintenance of laboratories of this kind is very essential to the efficiency of the work in the field.

QUARANTINES.

The same policy is still followed in dealing with overseas importations. Intending importers must first obtain a permit for the importation of any live stock. All animals with the exception of horses are quarantined at the port of landing. On the Atlantic seaboard, three quarantine stations are maintained, one at Quebec, another at Halifax, and the other at St John. A veterinary superintendent is employed at each of these stations with whatever lay assistance is necessary. Adequate accommodation for stock is provided and everything possible is done to not only keep the separate importations isolated while undergoing detention, but to provide suitable exercising grounds for each particular shipment.

The importations from Great Britain have naturally decreased since the commencement of the war, but there were, during the past fiscal period, 613 cattle, 796 sheep, and 5 goats actually imported.

MEAT AND CANNED FOODS DIVISION.

The details in connection with the scope and the carrying on of the work under the Meat and Canned Foods Act have been described at different times during the past. It is therefore unnecessary for me at present to offer any further comment.

Its objects are to ensure a sound, safe, wholesome meat food supply for our foreign customers and for those who purchase meats from establishments operating under the Act. Some criticism has been made that the Act does not go far enough inasmuch as it does not provide for municipal or local inspection. In answer to this I wish to quote from a leaflet issued some time ago, entitled "The Canadian Meat Inspection Service":—

> "Before the Meat and Canned Foods Act was introduced in the House of Commons, by the Honourable Sydney Fisher, the Minister of Justice was asked for an opinion as to the powers of the Federal Government with reference to meat inspection.
>
> "His reply was that while these powers undoubtedly warranted the Federal Government in undertaking the inspection of articles exported from the Dominion or from one province to another, there was very grave doubt as to whether they would permit of a similar inspection of articles the trade in which was confined within the boundaries of any one province.
>
> "This limitation was especially applicable to meat inspection, a subject intimately associated with public health, one of the matters which, since 1872, has been dealt with altogether by the provincial authorities.
>
> "Provision is made either by the Municipal Act or by the Public Health Act of each province, and in some cases by both, for the establishment and carrying on of municipal meat inspection, and that this legislation has, up till now, in too many cases, remained a dead letter, or, at best, been very ineffectively enforced, is no fault of the Federal authorities.
>
> "Further, a little consideration will, I think, demonstrate the utter impossibility of any Federal department undertaking the supervision, in all its ramifications, of the local meat trade, in every town and village throughout the Dominion.
>
> "On the other hand, under the provincial laws above mentioned, it is quite possible for municipalities to organize at but little cost a thoroughly effective system of local meat inspection, the machinery being, in many cases, already provided, and the additional expenditure, therefore, comparatively small.
>
> "I am satisfied that once the Canadian public has become seized of the situation, they will insist upon the adoption, by the various municipal authorities throughout the country, of a much more thorough system of dealing with butchers and the meat trade generally than has hitherto been tolerated.
>
> "It does not appear to me that there is any need for or likelihood of conflict.

"We are setting a fairly high standard, and all that is required is for the municipalities to adopt, under the legislation now existing, regulations somewhat similar to ours, with the view of rendering unmarketable, diseased or otherwise unsound meats, which, under present conditions, cannot enter establishments engaged in export or interprovincial trade.

"The first and most important step in this direction will, it is needless to say, be the providing of public municipal abattoirs, to be conducted under inspection methods similar to those required by the Meat and Canned Foods Act, especially as regards the admission either of live animals or their carcasses.

"The sooner the private slaughter house is abolished altogether, the better for all concerned, as most of the objectionable meats placed on the market emanate from these undesirable and unsanitary places.

"The trade in home-killed dressed carcasses will also, for similar reasons, gradually be wiped out of existence, and although the abolition of this form of meat disposal will probably cause some temporary dissatisfaction among farmers, matters will soon adjust themselves and the profits to the producer will be in no way lessened, although the livers and other offal hitherto utilized by the household will be no longer available.

"The municipal abattoir is a modern necessity and must come."

Wonderful progress has been made during the ten and a half years of operation of the Meat and Canned Foods Act. Our methods of inspection have improved and have kept pace with modern ideas and practices. The improvement in the sanitary construction, equipment and methods employed in inspected establishments has been all that could be hoped for. It is no idle boast, nor any exaggeration, to say that our system and service is at the present time second to none.

To the managements of the various establishments under inspection I wish to express my appreciation of their co-operation. We have not always been able to see conditions in the same light, yet all differences of opinion have been adjusted in an amicable and satisfactory manner.

The officers of this Division have been faithful in the performance of their duties. Owing to the number of qualified technical inspectors who were permitted to go overseas, and of those who, when refused permission to do so, tendered their resignation, the work became very heavy for those who remained on duty. They, however, met the situation as best they could with little complaint.

In view of the increasing cost of living, it was decided to raise the minimum salary paid to our technical officers. Needless to say, this has been very much appreciated.

During the year the Canada Food Board decided that it would be in the public interest to permit the use of oleomargarine. The administration of the Order in Council and regulations governing the trade was handed over to this branch in so far as the manufacture and importation of the product was concerned, its retail sale being closely watched by officials of the Dairy and Cold Storage Commissioner's Branch.

FRUIT AND VEGETABLES.

Owing to the unfavourable season the pack was light, consequently the prices were much higher than usual.

The sanitary conditions in the canning establishments were well maintained; many improvements and alterations were made in a number of the plants. Owing however, to the scarcity of skilled artisans and the very high price of all kinds of building material we were not able to have all the improvements which we would wish made to some of the smaller plants.

The apple evaporators, owing to the scarcity of apples, had little to do. Many did not operate, and those that did worked only for a very short time. The enforcement of the standard regarding moisture-content has resulted in a remarkable improvement in the finished product, so much so that it can now be said that Canadian evaporated apples stand second to none.

A very large amount of vegetables has been dried for the use of the Allied Armies. This trade is somewhat new to Canada but it has now been proved that it is both a practical and a profitable method whereby the surplus of many varieties of vegetables can be taken care of and held over for use during the seasons when such valuable foods are scarce.

The establishments preparing condensed and evaporated milk and milk powders were never so busy. The enormous demand for these products has taxed to the uttermost the plants engaged in their manufacture. These places are, almost without exception, models of sanitation, and require little comment.

FRUIT BRANCH.

THE FRUIT SEASON.

The apple season of 1917 was even poorer than the previous year. Spring was exceptionally late and cold, and was followed by heavy rainfalls, making thorough spraying difficult and inducing a rapid development of apple scab. There was a very heavy June drop of apples in British Columbia which caused earlier prospects to fall down to some extent. These conditions were succeeded by very hot dry weather in all districts during July and August, particularly serious in the irrigated sections of British Columbia where a scarcity of water was greatly felt.

The British embargo on apples deprived Nova Scotia of its usual export market and it was doubtful, early in the season, whether there would be sufficient demand in Canada to consume the entire output of the Annapolis valley. Owing to the very light apple crop in Ontario and Quebec, however, it became necessary for the large consuming markets in the eastern provinces as well as in the prairies, to obtain their supply from Nova Scotia and British Columbia. It was therefore possible for practically the entire apple crop to be moved westward. By the end of March, 1918, there were very few apples still remaining in the hands of growers and shippers.

The successful marketing of the Canadian apple crop of 1917 was unquestionably due to the poor yield in Ontario and Quebec. Should there be an average crop in all

the apple-producing provinces in 1918, special efforts will probably have to be made to move the available fruit into profitable channels of consumption.

The crop of tender fruits in the Niagara Peninsula and in other parts of the Dominion was only medium.

FRUIT CROP REPORTS.

Fruit crop reports were published each month from June to September, inclusive. Telegraphic reports were issued twice weekly from August till February. As the season advanced these reports fully outlined the prospects in Canada and the United States and also reported current prices in the leading Canadian markets.

PRICES.

Prices for all fruits were exceptionally high. Small fruits and tomatoes were always in demand. The demand for peaches, pears, plums, and cherries, owing to the increased quantities used for canning, also continued strong and at prices seldom realized by the grower.

The apple situation was peculiar. On account of the extremely short crop in Ontario and Quebec, the trade quite early turned their attention to British Columbia and Nova Scotia for their supplies. A large proportion of the crop in British Columbia was disposed of early in the season at prices which, at that time, were considered maximum prices under existing conditions; but these advanced steadily for some weeks following the opening of the shipping season. In Nova Scotia the growers early in the season were feeling much concerned as to the prices they would receive. This condition, however, was entirely changed after the unprecedented number of enquiries for quotations and the many offers to purchase supplies. The f.o.b. prices for winter varieties advanced in many cases from 25 to 75 per cent during September. The demand for Ontario apples was very keen, and record prices were paid for winter stock. Fameuse, McIntosh Red, and other popular varieties grown in Quebec met with ready sale and in many cases the prices were higher than those paid in 1916.

In the early months of 1918 many dealers who had been holding stock all winter were forced to sell at lower prices than those at which the fruit was bought, in order to move it into consumption without waste.

So far as the growers' prices are concerned, the season of 1917 may be considered remarkably successful.

CONVENTION OF FRUIT GROWERS.

As a result of frequent requests from all parts of the Dominion, a convention of representative growers was held in Ottawa on March 26 and 27. The main objects of the conference were: (1) to effect greater standardization of fruit packages; (2) to make certain amendments to the Inspection and Sale Act, Part IX; and (3) to give to the Dominion Fruit Inspectors more administrative power and responsibility in the performance of their duties.

There has been for a number of years a general feeling among fruit shippers that the great variation in the size of fruit packages should be corrected. Several meet-

ings were held in the different provinces at various times in order to discuss the standarization of packages, and definite recommendations were made to this Branch on many occasions. By calling together the various provincial representatives and by passing certain resolutions, many of the former difficulties have been removed. There will now be a uniform apple barrel and apple box for the Dominion as well as standard packages for practically all other fruits.

Resolutions were also passed defining more clearly—and thereby improving—various grades of fruit. It has long been felt that some definition of a No. 3 apple was essential to the industry, not only for the protection of the consumer but also in the interests of growers and distributors. Apples of the very poorest quality have been included in this grade, generally of course by growers who had no desire to create a demand for their pack. The definition of a No. 3 apple is now such that the consumer is assured of a fair grade of fruit which will serve a useful purpose in the household. The definition of the No. 2 grade has also been changed so that its standard of quality will be higher than formerly. A "domestic" grade has been made legal and will include apples practically equal in size and colour to the higher grades but slightly affected with minor blemishes. Legislation has also been recommended to make it compulsory for shippers to properly fill all packages of fruit and also to prohibit the marketing of immature fruit.

TRANSPORTATION.

In compliance with frequent requests of provincial and district Fruit Growers' Associations, also vegetable growers and shippers, the appointment of Mr. G. E. McIntosh as transportation officer to this branch was authorized May 1, 1917.

Mr. McIntosh visited the central shipping districts of each Canadian province, as well as competing western States. Local shipping complaints were investigated in the different provinces and dealt with either directly with the railway and express officials or through the Board of Railway Commissioners.

It has long been conceded that owing to the perishable nature of fruits it was dangerous to the industry to overlook the maintainance of the best possible transportation service. Growers and shippers are kept advised with the most modern methods of loading and every effort is being made to prevent the waste of food or food products by carrying companies.

The work is yet in an organization stage and, owing to the present congested condition of the railways, efforts have been confined largely to straightening the more complex problems arising in connection with the marketing of perishable agricultural products.

Crop conditions were such the past season that transportation difficulties were experienced principally in British Columbia, New Brunswick, Nova Scotia, and Prince Edward Island. The British embargo forced, for the first time, the Nova Scotia apple crop on the Canadian market, thus increasing rail traffic by approximately 2,100 carloads, and necessitating special traffic arrangements. In this particular instance, as well as in the movement of potatoes from New Brunswick and Prince Edward Island, and the fruit crop from British Columbia, valuable service was rendered both producers and consumers.

Express and freight tariff charges have been arranged in the interests of different shipping districts throughout Canada.

Insufficient team track accommodation at certain fruit and vegetable shipping centres has been the cause of considerable complaint, as well as rough handling in transit. In such cases the complaint has been investigated and representation made to the proper officials, or if necessary, referred to the Board of Railway Commissioners for final adjustment.

Shelters for the protection of express shipments of fruit have been obtained at points in British Columbia and Ontario.

The distribution of fertilizers and the providing of railway equipment for this traffic has received attention. During January, February and March, a somewhat serious situation in regard to greenhouse and cold-frame plant production has been removed by the prompt action of the carriers.

Efforts are being made to develop the soft fruit producing sections of New Brunswick by obtaining special express rates to the more distant markets.

Considerable interest is manifested by fruit and vegetable shippers in the circulars issued during the shipping season, giving traffic and other transportation information.

By having specific information supplied from an authentic source, the different railway and express companies are co-operating in the work and are giving special attention to deliveries of perishables, and also of feeds, seeds, spray material, etc., upon request from this office.

Meetings of growers were attended and addressed at Grimsby, St. Catharines, Toronto, Ont., Ste. Anne de Bellevue, Que., and Kentville, N.S.

The enforcement of Order in Council dated Monday, the 24th day of December, 1917, relating to car detention, and other transportation matters connected with the Canada Food Board, have been entrusted to Mr. McIntosh.

GENERAL.

Special efforts have been made during the past year to settle disputes between shippers and dealers. Difficulties have frequently arisen on account of cars being refused at destination by the consignee and the shipper having to accept low prices on the advice of the receiver. Apparently valid reasons were given but the shipper often had cause to doubt the soundness of these and to believe that the consignee was taking an unfair advantage. Similar difficulties arose on account of delays at shipping point, the non-filling of orders, the unloading of cars, etc. It therefore seemed necessary, in the interests of all concerned, to give assistance by making use of our inspectors as arbitrators. Much valuable work was done in this way.

Part of the work of this office has been closely associated with that of the Canada Food Board. The Commissioner and other members of this Branch assisted in the organization and subsequent operations of the Fruit and Vegetable Committee, which has been in active session since September last. Mr. C. W. Baxter, our Chief Fruit Inspector for Eastern Ontario and Quebec, is now in charge of that work at the office of the Canada Food Board.

In order to keep in close touch with the fruit inspectors and to directly supervise their work, the Commissioner visited the apple producing sections during the marketing season. Owing, however, to the urgent and important nature of this work in Ottawa, he did comparatively little travelling during the year.

INSPECTION WORK.

Inspection at point of shipment, which has now almost entirely superseded the old method of inspection at distributing and marketing centres, continues to prove satisfactory, alike to producer, dealer and consumer. It was of particular value in Nova Scotia this season where, owing to the British embargo, the growers had to seek a market for their crop on this continent, whereas in former years by far the greater proportion of their apples had gone to Great Britain and consequently their trade connections were all with that country. In dealing with new customers, both in Eastern Canada and in the West, the possibility of securing a certificate from one of our inspectors to accompany the bill of lading was the means of satisfactory closing many sales. Owing to the practical famine in apples which existed in Quebec and Ontario, the Nova Scotian growers and shippers found no difficulty in disposing of their crop at remunerative prices. So remunerative, in fact, were the prices offered for apples that everything harvested was packed for sale and shipments were made from sections that had never before attempted to do anything more with their apples than dispose of them locally. Therefore, while the general run of the Nova Scotian pack, particularly from the co-operative associations and the well established shippers, was all that could be desired in the way of grading and packing, a certain number of cars were shipped which were not satisfactory to the purchasers, and show the necessity of continuing the educational work as well as inspection.

The convictions for violation of the Inspection and Sale Act were thirteen, the same as in 1916-17.

Owing to the increasing importance of the small fruit, as well as the apple industry in New Brunswick, and at the earnest request of large numbers of growers there, two additional inspectors were appointed for work in that province.

In Quebec, where the crop was light and of poor quality, our inspectors were able to do valuable work in the orchards and packing houses, where their presence had a tendency to counteract the temptation to place as much fruit as possible in the higher grades, without too much attention being paid to the requirements of the law.

In Ontario, the inspection of small and soft fruits, started in 1915, has been followed up, our temporary inspectors being appointed early enough to inspect the first shipments of strawberries; and I am glad to be able to report that a very marked improvement is noticeable in connection with the two points that were most subject to complaint in the past, the shipping of immature fruit and the overfacing of open packages. There was only one prosecution during the past season for overfacing, that is the placing of fine, large, highly coloured specimens on the top layer of a basket while beneath the fruit is immature, off colour, small and otherwise inferior to the face or shown surface. This is a good record in comparison with 12 convictions in 1916, and 21 in 1915.

The crop of apples was abnormally light and of unusually poor quality owing to climatic conditions and, in many cases, to failure to properly spray due to lack of labour or the fear that the market would be poor. For this reason the larger proportion of the apples harvested had to be graded No. 3, so that it was only necessary for our inspectors in most cases to see that section 321 (c) had been complied with. For this reason, early in December it was possible to transfer ten of the men who were ordinarily employed on fruit inspection work in Ontario, to work in co-operation with the Canada Food Board in an attempt to move Prince Edward Island potatoes in lined box cars during winter months. Owing to unusually stormy weather, both on the Island and in New Brunswick, which resulted in holding up traffic everywhere, great difficulty was experienced with these shipments, but plans were laid and experience gained this winter that will be of undoubted value in dealing with the crop of next year.

In British Columbia, where an average crop was harvested, the pack was generally of very high quality and, though a few violations were reported and duly investigated by the Chief Inspector, it was not found necessary to prosecute in a single case during the season 1917-18. Any deviation from the law in the matter of grading was usually traced directly back to inexperienced help, which is a problem that has affected all the fruit districts but possibly British Columbia to an even greater extent than any other.

In addition to the inspection of fruit, members of the staff visited the basket factories for the purpose of seeing that the manufacturers were complying with the requirements of section 326. They have also assisted at fruit meetings, exhibitions and packing courses in the different fruit districts of the country.

INSPECTION STATISTICS.

The following table gives comparative statements of the number of lots inspected and the number of packages inspected for the seasons 1913-14 to 1917-18, inclusive:—

Variety.		No. of Lots inspected.	No. of Pkgs. in Lots inspected.	No. of Pkgs. inspected.
1913-14.				
Apples	Brls.	11,725	799,510	59,643
"	Boxes.	2,631	341,679	29,879
"	Bskts.	105	11,908	1,219
Crab Apples	Boxes.	193	13,250	1,462
Pears	"	977	48,274	8,559
Peaches	"	806	35,494	12,657
"	Bskts.	353	60,771	7,564
Plums	"	679	132,159	15,200
Tomatoes	"	173	59,707	7,305
Small fruits	Quarts.	736	1,128,907	95,841
Total		.....	.....	239,329
1914-15.				
Apples	Brls.	8,926	765,445	59,602
"	Boxes.	2,769	457,055	36,118
"	Bskts.	191	29,476	3,994
Crab Apples	Boxes.	38	2,443	951
Pears	"	894	91,121	9,760
Peaches	"	735	183,952	10,035
"	Bskts.	147	17,797	2,422
Plums	"	643	180,154	12,294
Tomatoes	"	305	103,742	12,171
Small fruits	Quarts.	1,162	1,529,598	151,599
Grapes	Bskts	244	308,728	22,394
Total		.....	.....	321,300
1915-16.				
Apples	Brls.	8,882	710,858	60,248
"	Boxes.	4,297	758,337	46,791
"	Bskts.	204	14,319	1,797
Pears	Boxes.	1,062	121,414	8,816
Peaches	"	1,022	270,508	12,575
"	Bskts.	838	106,569	10,796
Plums	"	998	482,416	22,231
Tomatoes	"	633	200,343	7,926
Small fruits	Quarts.	1,724	2,670,984	275,234
Grapes	Bskts.	260	382,332	11,395
Total		.....	.....	457,809
1916-17.				
Apples	Brls.	6,412	404,597	43,359
"	Boxes.	2,337	679,148	32,420
"	Bskts.	188	14,472	1,332
Pears	Boxes.	200	108,426	6,108
Peaches	"	1,179	289,560	15,612
Plums	Bskts.	609	158,133	7,215
Tomatoes	"	624	136,993	5,812
Small fruits	Pkgs.	2,039	282,365	99,799
Grapes	Bskts	193	273,435	7,951
Total		.....	.....	219,608
1917-18.				
Apples	Brls.	5,652	379,496	40,117
"	Boxes.	3,157	908,892	35,888
"	Bskts.	196	16,146	1,709
Pears	Boxes.	779	112,717	4,954
Peaches	"	1,303	224,228	14,481
Plums	Bskts.	773	195,084	5,952
Tomatoes	"	652	158,971	6,383
Small fruits	Pkgs.	1,312	248,539	14,637
Grapes	Bskts.	135	153,027	3,415
Total		.....	.....	127,536

ENTOMOLOGICAL BRANCH.

The work of the branch has comprised the conducting of investigations upon insects affecting farm, garden and orchard crops, forest and shade trees, domestic and other animals, household and public health, mills and stored products, and the giving of advice concerning the control of such insects; the administration of the regulations of the Destructive Insect and Pest Act in so far as insects are concerned; the suppression of the brown-tail moth in Nova Scotia and New Brunswick and the introduction of its parasites and predacious insect enemies into eastern Canada; and the administration of an appropriation for the care of the orchards on the Indian reservations in British Columbia.

In addition the officer in charge of this branch has been called upon to advise on questions relating to the protection of birds and mammals and the control of noxious species of animals and on account of the increased demands for assistance along these lines the additional office of Consulting Zoologist has been added to that of Dominion Entomologist, by Order in Council of April 10, 1917.

The investigation of insect pests and their control has been continued at the various entomological field laboratories and at Ottawa. Special efforts have been made to impress upon agriculturists throughout Canada the importance of crop protection as a means of securing increased production. In certain instances the officers at the field laboratories have devoted their time entirely to conducting demonstration work and crop protection extension work among the farmers and growers in their localities. Very great benefits have resulted from this work particularly in the case of potato, vegetable and fruit culture. The value of field laboratories has never been demonstrated so strikingly as it has since the need for increased protection became so urgent and throughout the entire season the officers in charge are inundated with inquiries and requests for assistance.

The following is a brief summary of the various lines of work that have been undertaken during the last year by the officers in charge of these laboratories and under the direction of the Dominion Entomologist:—

Annapolis Royal, N.S.—The control of insects affecting orchard crops including a continuation of experimental tests on the comparative value of different insecticides and their effect upon the trees and forest has been the chief line of investigation and much valuable information has been secured particularly in regard to the use of combined insecticides and fungicides and their effects on foliage. The value of arsenate of lime as an insecticide was again demonstrated. In addition to the maintenance of numerous demonstration orchards, extensive demonstration work was undertaken on potato spraying and increased yields were secured in certain districts as a consequence of this work.

Fredericton, N.B.—The Brown-tail moth control work in the Maritime Provinces is directed from this laboratory, which is also the headquarters for the work of introducing and establishing the parasitic and predacious enemies of the brown-tail moths and gipsy moths. The study of the natural control of the spruce budworms, tent caterpillars, fall web-worms and oyster-shell scale has made satisfactory progress. As a result of this investigation of the causes underlying outbreaks of insects and their

control, it has now become possible for us to attempt the distribution of the natural insect enemies from regions where control is effectual to other regions where such controlling agencies are absent. These studies were extended to Alberta and British Columbia during the past year. In addition crop protection extension work has been conducted in New Brunswick from the laboratory.

Hemmingford, Que.—The work at this laboratory has consisted mainly in demonstrating spraying in the orchards and in potato fields on numerous farms. Investigations on the use of dust insecticides in orchards have been carried out. In the dairying sections the control of the warble fly is being studied.

Vineland Station, Ont.—The officer in charge of this laboratory has continued his investigations on aphids, particularly those affecting fruit crops; in addition he has paid special attention to the control of insects affecting greenhouses and bush fruits and has been responsible for our extension work in the region served by this laboratory.

Strathroy, Ont.—The investigations on white grubs were continued and the work was considerably extended during the year, particularly in the direction of farm surveys. Attention was also given to other insects destroying field crops in western Ontario.

Treesbank, Man.—Insects affecting cereal crops form the chief lines of investigation at this laboratory. The study of the local species of white grubs was practically completed, and much additional information was obtained respecting grass stem maggots. Special attention was devoted to an outbreak of the western wheat-stem sawfly which occurred in certain parts of southern Manitoba and Saskatchewan.

Lethbridge, Alta.—Owing to the absence, on military service overseas, of the officer in charge of this laboratory, it has been necessary to discontinue temporarily the work of this laboratory.

Agassiz, B.C., Vernon, B.C., and Royal Oak, B.C.—At the permanent laboratory at Agassiz and at temporary laboratories at Vernon and Royal Oak a number of investigations were carried on including the control of the codling moth, and the pear thrips; attention was also paid to other pests affecting orchard, field and garden crops.

In co-operation with the Health of Animals Branch, investigations were conducted in Saskatchewan on swamp fever and also on horse bot flies and other blood-sucking insects affecting live stock.

At Ottawa investigations on white grubs were continued and experiments on the control of a number of insects affecting garden and field crops were continued with satisfactory results.

The Regulations under the Destructive Insect and Pest Act were revised and amended by Order in Council on July 17, 1917. On February 11, 1918, an Order in Council was passed amending the quarantine against plants, etc., from the Hawaiian Islands to permit the entry of pineapples and bananas subject to inspection having been made before shipment.

The inspection of nursery stock originating in Europe, Japan, and the New England States which is carried on under the Destructive Insect and Pest Act enabled us to

intercept a number of foreign insect pests which are carried in such plants; the most important of these pests being the Ermine moth, a serious enemy of orchard and shade trees in Europe which fortunately has not been introduced into Canada.

It has been possible to bring about a still further reduction in the infestation of the brown-tail moths in Nova Scotia and New Brunswick. In Nova Scotia 10,019 winter webs of this insect were collected during the winter 1916-17, as compared with 14,845 collected in 1915-16; and in New Brunswick, where a greater area is infested, 375 winter webs were collected during 1916-17 compared with 395 collected in the previous year. In Nova Scotia the insect is unfortunately spreading eastward and special attention is being devoted to the prevention of spread. The gipsy moth has not yet reached Canadian territory, and every effort is being made to prevent its introduction by artificial channels.

For the present the collection in the New England States of the insect enemies of the brown-tail and gipsy moths has been discontinued in order that attention may be devoted to the work of determining to what extent the parasites already introduced have become established, and a considerable amount of recovery work was undertaken during the year. Six colonies of predaceous beetles were received, however, from Massachusetts and were liberated in New Brunswick and British Columbia.

The investigations on forest insects have been continued along lines similar to those followed in preceding years, but it was necessary, through lack of assistance, to discontinue the work in British Columbia. Special attention has been devoted to the study of the timber borers and their control in eastern Canada and to the causes of extensive mortality among balsam. The studies on insects affecting shade trees made further and satisfactory progress.

The inquiry respecting the injury to stored grain and flour by insects has been continued. Miscellaneous investigations on insects affecting garden crops, greenhouses and household have been carried out.

Owing to the high price of some of the standard insecticides and shortage in certain districts an inquiry into the insecticide situation was undertaken and conferences were held with the manufacturers and chief importers of insecticides in Eastern Canada. To prevent any shortage the principle Canadian manufacturers are increasing their output for the coming season. Further, we have taken steps with a view to securing a better distribution of insecticides.

As Consulting Zoologist, the officer in charge of the branch has been required to devote a considerable portion of his time to questions relating to the consecration of native birds and mammals and the control of noxious species, particularly in his capacity as Secretary of the Advisory Board on Wild Life Protection. During the year that is past the Migratory Birds' Convention Act was passed; this puts into effect the International Convention for the protection of migratory birds in Canada and the United States. From the standpoint of agriculture this is a measure of immense importance as it provides for the absolute protection of all insectivorous birds which are such necessary factors in the control of insect pests.

The following publications have been issued from the Entomological Branch during the year:—[1]

Report of the Dominion Entomologist for the year ending March 31, 1917.

Entomological Bulletin—

No. 14. Canadian Bark-beetles, Part I: New Species, by J. M. Swaine.

Entomological Circulars—

No. 9. Common Garden Insects and their Control. By A. Gibson.

No. 10. Regulations under the Destructive Insect and Pest Act with instructions to Importers and Exporters of trees, plants and other nursery stock. By C. Gordon Hewitt.

Crop Protection Leaflets—

No. 1. Protection of Crops. By C. Gordon Hewitt.
No. 2. Prepare to Protect your Crops next Season. By C. Gordon Hewitt.
No. 3. Cutworms and their Control. By A. Gibson.
No. 4. Root Maggots and their Control By A. Gibson.
No. 5. Prevent White Grub Injury. By A. Gibson.
No. 6. How to Control Locusts or Grasshoppers. By A. Gibson.
No. 7. Rats and Mice. By C. Gordon Hewitt.
No. 8. Aphids or Plant Lice. By W. A. Ross.

In addition to the above publications the officers of the Branch have contributed papers embodying the more technical results of their work in the *Canadian Entomologist* and other scientific journals. Articles have also been contributed each month to *The Agricultural Gazette of Canada* on subjects to which the officers of the branch have been devoting study.

By the transfer of the entomological collections from the Victoria Memorial Museum, to the offices of the branch, the entire National Collection of Insects has been brought together during the past year and very satisfactory progress has been made in the arrangement of the various orders. We are indebted to those private collectors in Canada who have made donations to the collection during the year.

BRANCH OF THE CANADIAN COMMISSIONER, INTERNATIONAL INSTITUTE OF AGRICULTURE.

The finances of the institute reached their lowest point in 1913, when the reserve fund amounted to only $93,200. Since then, the amounts of the contributions to be paid by the adhering governments have been increased. On account of the war, however, some of the governments are behind in their payments. If all arrears had been paid at the end of 1917 the reserve fund would have amounted to $427,345. The actual cash reserve amounted to $212,860. As the result of economy in administration the financial situation of the institute is at present much better than before the war.

This policy of economy has not, however, prevented the addition from time to time of new publications. There was started during the year a new monthly periodical entitled "Documentary Leaflets," comprising materials which, from their irregularity and lack of periodicity, could not be included in the "International Crop Report and Agricultural Statistics." The new bulletin deals chiefly with meats, animal products, fish, and tropical products such as rubber, cocoa, tea, preparation of the soya bean and other arachidæ, nuts, oils, citrus and various other fruits, woods, etc. There was also published a very useful monograph of 83 pages, accompanied by numerous diagrams and charts, entitled: "The Grain Market of Rotterdam," by V. Van Peski, Secretary of the Confederation of Importers of Cereals and of the Grain Exchange, and by D. L. Uyttenboogaart, Secretary of the Grain Elevators.

Sir James Wilson, K.C.S.I., who had been representing Canada as well as the other British Governments as the resident delegate on the permanent committee at the meetings immediately preceding the war, shortly after the death of his son on the field of battle in October, 1917, returned to England, and was temporarily replaced at the winter meetings of the permanent committee by the Hon. William Erskine, M.V.O., Councillor of His Majesty's Embassy at Rome. Mr. Erskine's appointment as temporary delegate was renewed for the permanent committee meetings of 1917-18.

At the winter meetings of 1918 Mr. Louis Dop, vice-president, presented a very interesting sketch of the accomplishments of the institute for the ten years from the time it was placed on a full running basis in 1909. He laid special emphasis on the international agreements which have been brought about, particularly in relation to crop reporting and the protection of birds useful to agriculture, agricultural meteorology, and the diseases of plants. These accomplishments have been referred to in our preceding annual reports, which have also set forth the methods followed for disseminating in Canada the scientific and practical information published by the institute in its three regular monthly publications and in the international Year Books of statistics and of agricultural legislation. Among the subjects which, from the number of important articles involved, assumed the character of an educative campaign throughout the greater part of the 10-year period, either in the "Bulletin on Foreign Agricultural Intelligence" or in the "Agricultural Gazette," may be mentioned a few which apparently have been followed by definite results in Canada. Those of an educative character have covered agricultural co-operation and co-operative credit, together with other agricultural organization and administration, the application of meteorology to agriculture, with special regard to the critical periods of rainfall, protection against frosts, etc.; the protection of birds; farm book-keeping and the basis of farm accounting; dry farming methods; the results of trials of farm tractors and implements; different systems of flax retting; the Rothamsted experiments in England and the plant breeding experiments at Svalof, Sweden; discoveries of new active factors in foods and feeding stuffs, and all new processes such, for instance, as overhead electric discharge and crop production; also questions of agricultural economy connected with the war and with the settlement of returned soldiers. It is very satisfactory to observe that the system of crop reporting and publication advocated for many years by this Branch has recently been adopted almost in its entirety for the Federal and Provincial services.

Among the more important articles communicated by this branch, and published during the year in the International Institute Section of the "Agricultural Gazette," are the following: "A Biological Analysis of Pellagra-Producing Diets"; "The Problem of Agricultural Meteorology"; "Recent Work at Rothamstad on the Partial Sterilization of the Soil"; "New Experiments on Soil Sterilization in France"; "Review of Investigations in Soil Protozoa and Soil Sterilization"; "Overhead Electric Discharge and Crop Production"; "Spray Irrigation"; "Report on Experiments on Humogen"; "A New Physiological Theory of Heredity"; "Economics of the Breeding of Pure Bred Stock"; "Mechanical Milking"; "Dust Explosions and Fires in Grain Separators in the Northwest"; "Comparative Cost of Tractor and Horse Power in the United States"; "Devices for Disabled Farmhands"; "Fuel Alcohol in Australia"; "Industrial Retting of Textile Plants by Microbiological Action"; "Meat Production and Trade in the United States and Other Countries"; "Breadmaking Trials in France by the War Administration"; "A Statistical Enquiry into Co-operative Organizations in the United States"; "Danish Co-operative Societies for the Export of Eggs"; "Federal Banks and Financial Organization in the United States"; "Regulation of the Fruit Business in the United States;" "Agriculture and the War in Great Britain"; "Settlement of Ex-Service Men within the British Empire after the War"; "Settling of Discharged Soldiers on the Land in New Zealand"; "Agricultural Training for Partially Disabled Belgian Soldiers"; "Blind Soldiers and Agriculture"; "Notes on the World's Wheat Situation"; "Wheat Prospects after the War"; "Production, Trade and Consumption of Oats, Barley and Rye"; "World's Wheat Prospects for the Grain Year 1917-18"; "The Wheat Situation Present and Prospective"; "The World's Live Stock and the War."

The Library.—The removal of the library at the beginning of the fiscal year 1917-18 to the rooms in the West Block has provided much needed accommodation for the growing resources of the library. During the year 1,300 bound volumes and 6,677 pamphlets were added. These include 298 from binding and 1,002 from purchase or gift. The most notable donation was that of Mr. J. A. Ruddick, Commissioner of Dairy and Cold Storage, who donated 207 bound volumes, 213 unbound books and pamphlets and a large number of back issues of periodicals which were needed to complete files. There are now in the library 4,748 bound volumes and 33,807 unbound books and pamphlets.

Guided by the "Agricultural Index," we have chosen for subscription most of the periodicals indexed in it and also make an effort to obtain all other material issued by governments, societies, etc., which is included in it. We receive also by exchange agricultural periodicals published by the different countries all over the world.

The catalogue now numbers 183,000 cards (estimated). During 1917-18, 1,147 were issued by the United States Department of Agriculture for publications of their department; 600 were received from the Office of Experiment Stations for Experiment Station publications; 6,162 Library of Congress cards were added to the depository catalogue of agricultural literature.

Some of the investigations made during the year were as follows: Wheat breeding; potato desiccation; sugar beets; municipal markets; the rural church; farm

labour; food subjects; co-operation; agricultural credit; alcohol as a source of power; cost of feeding poultry; food control; fish waste; vacant lot cultivation; seed control in Denmark; mushrooms; marketing of farm products; forest improvement; birds.

The library at the headquarters of the Institute at Rome has been recently reported to have on its shelves 70,000 bound books, unbound publications and pamphlets. There is now in preparation a complete catalogue of its publications, comprising works entered up to December 31, 1917. At the end of the war it is expected the accession of books will be such that it will become one of the great libraries of the world. 2,660 reviews and newspapers are received, examined, and the pertinent materials summarily extracted for publication monthly. It is in this way that the Institute keeps adhering Governments and the public in close touch with the world's agricultural movement, thus constituting a unique observatory of the progress in agriculture whether technical, economic or social.

PUBLICATIONS BRANCH.

The outstanding feature of the work of the Publications Branch during the past fiscal year was the increase in the number of publications sent out to persons on the various mailing lists and in response to requests for bulletins, reports and other pamphlets issued by the several branches of the Department. The increase which exceeds 100 per cent has been confined chiefly to bulletins and pamphlets, the number of reports issued having been materially reduced. The following table shows the character and number of the publications distributed:—

	Mailing Lists.	Requests.
Reports	25,074	75,166
Bulletins	1,574,161	86,364
Seasonable Hints	833,040	8,700
Pamphlets	747,650	34,200
Circulars	4,699,716	123,382
Leaflets	3,100	6,100
Request Cards	556,000	
The Agricultural Gazette	70,118	3,946
Total	8,512,949	337,858

Besides the addressing of envelopes for our own distribution, we addressed, from our newspapers sets of stencils, a large number for the office of the Food Controller and Live Stock Branch and the Dairy Branch of this Department, amounting in all to about 75,000 envelopes.

For upwards of two years this branch has been engaged in reclassifying the mailing lists which contain upwards of 300,000 names. This has been necessary to avoid duplication, when a publication such as "Seasonable Hints," which deals with practically all branches of agriculture, is sent out. During the year the original English lists, taken over by the Publications Branch some years ago, for the provinces of New Brunswick, Manitoba, Saskatchewan, Alberta, and British Columbia have been revised and transferred to the new classification. About 30,000 French names, chiefly from the province of Quebec, have also been revised and transferred. When the reclassification shall have been completed a publication can be sent to all the addresses on these lists, and combinations thereof, without duplication. In a list so large constant revision is necessary. The removal of individuals and the extension of the rural mail delivery service renders this work important and continuous.

During the year this revision has necessitated the changing of 19,700 addresses and cancelling of 45,320 names. With the changing of addresses and the addition of new names 217,500 stencils have been embossed during the twelve month period.

In the editorial division, press notices of all new publications have been prepared and distributed, and The Agricultural Gazette of Canada has been planned, edited, and published from month to month.

III. PATENTS OF INVENTION.

The following tables show the transactions of the Patent Office, Department of Agriculture, from April, 1917, to March 31, 1918:—

Application for patents		8,683
Patents and certificates granted—		
Patents	7,233	
Certificates	1,847	
Total		9,080
Caveats		364
Assignments of Patents		3,425
Notices under section 8		554

Receipts.	$ cts.	Expenditure.	$ cts.
Cash received	228,278 57	Salaries	89,850 00
Cash refunded	4,226 64	Patent Record	32,681 23
			122,531 23
		Receipts over expenditures	101,520 70
Net cash	224,051 93		224,051 93

DETAILED STATEMENT Patent Office Fees for Year 1917-18.

STATEMENT of Fees Received by the Patent Office Branch from April 1, 1917 to March 31, 1918.

1917.	Amount Received.	Notices.	Patents.	Assignments.	Certified Copies.	Caveats.	Sundries.	Patent Record Subscription.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts	$ cts.	$ cts.	$ cts.
April	19,704 76	145 90	18,124 14	678 95	242 95	225 00	18 00	269 82
May	19,971 82	129 10	18,558 36	799 05	225 10	130 00	77 00	53 21
June	19,168 46	99 40	17,740 61	880 95	245 75	165 00	17 00	19 75
July	18,705 12	101 90	17,613 27	566 58	235 87	165 00	18 50	4 00
August	19,273 70	104 90	18,179 95	650 05	179 30	120 00	26 00	13 50
September	15,847 86	83 10	14,941 76	488 10	158 45	100 00	56 90	19 55
October	20,382 44	100 50	19,180 74	693 00	209 40	130 00	55 50	13 30
November	19,980 44	90 00	18,769 99	751 35	198 50	118 00	32 00	20 60
December	15,994 91	81 00	14,954 81	623 10	182 40	105 00	13 00	35 60
1918.								
January	18,401 57	79 00	17,297 27	582 10	238 95	170 05	22 00	12 20
February	19,309 85	82 00	18,311 15	503 40	191 30	180 00	16 00	26 00
March	21,537 64	77 00	20,091 84	761 85	316 35	196 00	40 00	54 60
	228,278 57	1,173 80	213,763 89	7,978 48	2,624 32	1,804 05	391 90	542 13
Refunds	4,226 64	65 00	3,607 00	113 55	119 49	11 00	308 00	2 60
Net totals	224,051 93	1,108 80	210,156 89	7,864 93	504 83	1,793 05	83 90	539 53

The total number of patents granted to Canadian inventors was 973, and were distributed among the provinces of the Dominion as follows:—

Ontario	398
Quebec	220
British Columbia	83
Manitoba	91
Alberta	61
Saskatchewan	84
New Brunswick	14
Nova Scotia	18
Prince Edward Island	3
Yukon	1

Patents issued to residents of Canada, with the ratio of population to each patent granted:—

Provinces.	Patents.	One to Every.
British Columbia	83	4,728
Manitoba	91	5,006
Saskatchewan	84	5,862
Alberta	61	6,142
Ontario	398	6,339
Yukon	1	8,512
Quebec	220	9,105
New Brunswick	14	25,134
Nova Scotia	18	27,352
Prince Edward Island	3	31,242

Statement of the number of patents issued under this Act, on which the fees are paid for periods of six, twelve, or eighteen years, at the option of the patentee; and of patents on which the certificates of payments of fees were attached after the issue of patents originally granted for periods of six and twelve years:—

Period for which fees were paid on first issue—	
6 years	7,196
12 "	4
18 "	33
Patents on which Certificates were attached after issue—	
6 years	1,781
12 "	66
Reissues—	
6 years	10
12 "	1
18 "	0

COMPARATIVE STATEMENT of the transactions of the Patent Office from 1908 to 1918, inclusive.

Years.	Applications for Patents.	Patents and Certificates Granted.			Caveats.	Assignments of Patents.	Fees Received.
		Patents.	Certificates.	Total.			
							$ cts.
1908	7,406	6,774	744	7,518	317	2,900	178,482 49
1909	7,239	6,395	827	7,222	319	3,001	176,692 05
1910	7,789	7,223	1,010	8,233	448	3,147	194,571 54
1911	8,037	7,249	1,002	8,251	406	3,256	200,164 41
1912	8,293	7,399	1,113	8,512	348	3,725	207,762 77
1913	8,681	7,502	1,199	8,701	353	3,741	218,125 02
1914	8,359	7,918	1,323	9,241	354	3,432	215,001 71
1915	7,302	6,867	1,211	8,078	391	3,391	190,028 37
1916	7,793	6,812	1,419	8,231	419	3,311	202,630 40
1917	8,751	7,520	1,599	9,119	358	3,661	227,094 09
1918	8,683	7,233	1,847	9,080	364	3,425	228,278 57

NATIONALITY OF INVENTORS.

Countries.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	1918.
United States of America	4,885	4,997	4,964	5,220	4,645	4,972	5,772	5,631
Great Britain and Ireland	359	506	495	558	450	360	352	318
*Germany	304	336	307	300	107	14	10	2
Australia	77	99	75	76	76	76	62	53
France	97	108	100	115	83	55	45	34
New Zealand	33	46	47	50	29	31	37	35
Sweden	54	52	64	40	40	44	43	47
Belgium	25	20	23	33	19	21	5	3
*Austria	20	24	40	35	11	0	0	0
Italy	12	6	16	14	15	8	8	10
Switzerland	26	23	20	22	14	22	10	25
Denmark	5	14	15	16	11	12	18	9
Transvaal	16	10	7	1	3	3	3	2
Hungary	6	6	6	5	5	0	0	0
Russia	18	6	17	13	9	5	6	16
Norway	20	17	10	32	24	29	20	28
Newfoundland	3	1	2	1	1	1	0	0
Netherlands	0	.....	.....	7	4	2	2	0
Mexico	7	10	8	7	4	4	0	3
Cape Province	3	4	4	1	0	0	1	0
Cuba	5	1	1	9	3	0	0	1
Spain	3	.....	.....	1	1	3	0	1
Chile	1	.....	1	0	0	1	0	0
Finland	1	.....	1	0	0	0	0	1
Portugal	0	.....	.....	0	1	0	0	0
Roumania	1	1	.....	0	1	0	0	0
Grand Duchy of Luxemburg	0	.....	.....	0	3	0	0	0
Algeria	1	.....	.....	0	0	0	0	0
Japan	0	2	2	1	3	2	1	3
India	5	3	1	7	3	0	0	1
Natal	0	1	2	0	0	1	0	2
Nicaragua	1	.....	.....	0	0	0	0	0
Brazil	2	1	.....	1	3	0	2	3
Turkey	0	.....	.....	0	0	0	0	0
Poland	0	.....	.....	0	0	0	0	0
Holland	11	8	7	8	5	2	7	13
Argentine Republic	1	1	.....	2	3	5	3	2
Panama (Canal Zone)	0	3	.....	3	0	1	0	0
Egypt	1	.....	.....	1	1	0	1	0
Southern Rhodesia	.....	.....	.....	0	0	2	0	1
Peru	.....	3	2	0	0	0	1	1
Hawaii	.....	3	3	0	0	2	4	4
Venezuela	.....	2	1	1	0	0	0	0
Trinidad	.....	1	.....	0	0	0	0	0
Porto Rico	.....	1	2	0	0	0	0	0
Tunis	.....	.....	1	0	0	0	0	0
Ceylon	.....	.....	1	0	0	0	0	0
Straits Settlements	.....	.....	1	0	0	0	3	0
Philippine Islands	.....	.....	.....	1	1	2	0	1
Canary Islands	.....	.....	.....	1	0	0	0	0
Java	.....	.....	.....	1	0	0	0	0
Channel Islands	.....	.....	.....	1	0	0	2	0
China	.....	.....	.....	.....	1	0	0	0
West Indies	.....	.....	.....	.....	1	0	0	2
Isle of Man	.....	.....	.....	.....	1	1	0	0
Norfolk Islands (South Pacific)	.....	.....	.....	.....	2	1	0	0
Alaska	.....	.....	.....	.....	2	1	5	3
Bermuda	.....	.....	.....	.....	1	2	0	0
Zululand	.....	.....	.....	.....	0	1	0	0
Central America	.....	.....	.....	.....	.....	.....	1	2
Dutch East India	.....	.....	.....	.....	.....	.....	.....	2
Dominican Republic	.....	.....	.....	.....	.....	.....	.....	1

* All patents credited to Germany and Austria since 1914 are those in which the inventors, while residents of Germany or Austria, were citizens of countries which are not at war with Great Britain or her Allies, or patents which had been assigned previous to August 4, 1914, to assignees who are not alien enemies.

The total number of reports issued by the examiners during the year was 11,695 and 11 patents were surrendered and reissued.

Out of the total number of patents granted by this office during the year there were 5,631 issued to inventors or assignees resident in the United States, being 78 per cent of the whole issue.

IV. COPYRIGHTS, TRADE MARKS, INDUSTRIAL DESIGNS AND TIMBER MARKS.

STATEMENT of Fees received by the Copyright and Trade Mark Branch from April 1, 1917, to March 31, 1918.

Month.	Trade Marks.	Copy-rights.	Designs.	Timber Marks.	Assign-ments.	Copies.	Totals.
1917.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
April	3,360 90	154 20	158 00	4 00	24 00	4 00	3,705 10
May	3,145 25	158 00	128 00	2 00	39 00	19 75	3,492 00
June	2,810 20	121 50	50 00	.....	43 50	8 25	3,033 45
July	3,190 05	159 00	119 00	4 00	29 00	25 75	3,526 80
August	2,677 00	123 65	89 00	4 00	18 00	24 00	2,935 65
September	2,063 15	123 50	94 90	8 00	50 00	18 50	2,358 05
October	3,254 00	157 00	85 00	6 00	18 15	33 50	3,553 65
November	3,308 18	143 10	101 00	10 50	38 00	24 00	3,624 78
December	3,133 14	142 15	69 00	6 00	61 00	24 00	3,435 29
1918.							
January	4,039 97	110 30	88 00	.....	62 00	23 00	4,323 27
February	3,370 76	118 65	74 00	9 00	32 00	17 00	3,621 41
March	3,475 03	170 10	135 00	7 05	40 00	35 50	3,862 68
	37,827 63	1,681 15	1,190 90	60 55	454 65	257 25	41,472 13
	9,039 95	25 00	122 40	16 00	3 50	.....	9,206 85
Refunds	28,787 68	1,656 15	1,168 50	44 55	451 15	257 25	32,265 28

The particulars of the registration made by the Copyright and Trade Mark Branch of the Department of Agriculture during the year ended March 31, 1918, was as follows:—

I. Copyrights—		
Full Copyrights without certificates	1,146	
Full Copyrights with certificates	112	
Temporary Copyrights without certificates	43	
Temporary Copyrights with certificates	1	
Interim Copyrights without certificates	112	
Interim Copyrights with certificates	15	
Renewals of Copyrights	11	
Assignments	31	
		1,471
II. Trade Marks		987
Renewals of Specific Trade Marks		90
Assignments of Trade Marks		180
III. Industrial Designs		177
Renewals		11
Assignments		16
IV. Timber Marks		31
Assignments		7
Total Registrations		2,970

The following table shows a comparative statement of the business of this branch from 1908 to 1917, inclusive:—

Year.	Copyrights Registered.	Certificates of Copyright.	Trade Marks Registered.	Industrial Designs Registered.	Timber Marks Registered.	Assignments Registered.	Fees Received Gross.	Fees Received Net.
							$ cts.	$ cts.
1908	1,416	170	892	162	44	343	37,514 00	....
1909	1,535	171	1,059	143	108	174	38,071 31	.....
1910	1,699	206	1,021	118	39	386	42,153 76	.....
1911	1,593	213	1,212	149	39	230	43,327 86	.. ..
1912	1,760	205	2,315	228	15	559	51,043 21	43,061 56
1913	1,835	207	1,378	165	57	264	49,409 68	41,251 98
1914	1,675	193	1,106	224	24	242	39,599 69	32,840 87
1915	1,477	146	1,019	215	27	279	35,653 21	29,645 11
1916	1,384	160	840	196	55	333	35,829 21	28,642 81
1917	1,440	128	987	177	31	234	41,472 13	32,265 28

V. PUBLIC HEALTH AND QUARANTINE.

I have the satisfaction of being able to state that no epidemic infectious disease from abroad has been allowed to enter Canada this year.

Coast Quarantine.—At my quarantine stations on the Atlantic and Pacific oceans, 239,125 persons have been inspected. In 1913 the number was 706,679.

Three hundred and six persons were admitted into hospital at the various stations. In 1913 the number was 1,996.

The greatly reduced number of persons inspected and of patients admitted to hospital, as compared with figures before the war, is doubtless due to the marked diminution of immigration owing to the war.

These figures of the year before the war are liable to be equalled or surpassed after it ends, when demobilization and return of our army takes place, and the tide of immigration once more sets in.

The diseases met with were smallpox, leprosy, diphtheria, scarlet fever, measles, mumps, dysentery, and erysipelas.

In every instance the disease was stamped out at the station, and so prevented from appearing inland.

Circulars.—Circular letters were issued from time to time to my different officers, drawing their attention to the various matters during the year connected with the appearances and movements of epidemic diseases abroad.

Inland Frontier Quarantine.—Smallpox having developed to an epidemic degree in the neighbouring state of Maine, an international frontier quarantine inspection was ordered at McAdam Junction, N.B., on August 15. This had to be continued until the 30th of September.

Owing to a renewed outbreak of this disease in Maine, and appearing especially amongst the potato reapers returning from that state to Canada, chiefly along the Aroostook border, an international frontier medical quarantine was instituted at Perth, N.B., at the various international highway crossings and on the Aroostook county frontier on November 2, 1917. Owing to the cessation of this threatening, I am causing this inspection to be discontinued after to-day.

Prince Edward Island, by the terms under which, as a province, she entered confederation, has the right of quarantine protection, by the Federal Government, from the other provinces of the Dominion, as well as from abroad. She is the only province that has such right. Smallpox having appeared to a threatening extent in Maine and in New Brunswick, I instituted, on March 4, at the request of the Government of Prince Edward Island, the quarantaine medical inspection of the car ferry arriving at Port Borden, P.E.I., from the mainland, by my quarantine officer from Summerside.

This car ferry itself being the only and all-important means of regular communication, it was further represented to me that infection amongst its crew would be very serious. I therefore substituted for the inspection at the port of arrival at Port Borden,

P.E.I., an inspection on the trains between Sackville and Cape Tormentine, N.B. This inspection is still being enforced.

Leprosy.—The leper lazaretto, Tracadie, N.B. There are at present in this lazaretto thirteen lepers, six males and seven females, only about half the number there were a few years ago. Eleven are of French-Canadian (Acadian) origin, one of Icelandic, and one Russian.

There was one death during the year, a Syrian and one Acadian patient re-admitted.

Amelioration of symptoms and sufferings continues to be experienced and observed under the treatment now being carried out.

My officers report their high admiration of the continual devotion of the nursing religious sisters in their attendance on the lepers.

Darcy Island Lazaretto, B.C.—Five cases of leprosy have been admitted during the year, one Chilean-Kanaka, three Chinese and one Anglo-Indian.

The Chilean was so much recovered as to be no longer a danger to others by October last. He was therefore released, but reports from time to time for examination which so far has continued to prove negative.

Public Works Health Act.—My inspectors report that the general health of the men employed on the various works connected with the construction of railways, canals, bridges, tunnels, etc., has been exceptionally good, that the general sanitary conditions of the camps have been excellent, as has been also the attention given by the various contractors and district medical officers in complying with the requirements and regulations.

Changes in Stations.—Owing to the absence or very small number of foreign vessels arriving during the last few years at the ports of Prince Rupert, B.C., Digby, N.S., and Summerside, P.E.I., it has been directed that these ports revert to the position common to all the smaller ports on each ocean. For the future therefore they will be rated amongst the Unorganized Maritime Quarantine Stations.

The whole respectfully submitted.

T. A. CRERAR,
Minister of Agriculture.

PUBLIC HEALTH.

APPENDIX No. 1.

March 31, 1918.

Sir,—I was appointed by Order in Council, on January 14, 1899, sanitary adviser to the Dominion Government. As such I have yearly, since then, included in my annual report a synopsis of the progress of infectious disease throughout the world during the year. Also a short account of what has been accomplished during the year in the way of the advancement of sanitary science, and of the measures for the treatment and control of epidemic disease.

I have, however, recently received officially a copy of a printed circular headed "Suggestions for the Preparation of Government Reports," prepared by the Editorial Committee, and approved by Order in Council on October 23, 1917. It includes amongst other things the following directions:—

> "Annual reports should be confined to concise accounts of the work of the several departments during the period covered by the reports."
>
> "Contributions to knowledge, in the form of scientific discussion, should have no place in an annual report."
>
> "For the purposes of the annual record, the formal introduction and signature, 'I have the honour to submit herewith my annual report,' etc., and 'I have the honour to be, Sir,' etc., will be dropped, and the form substituted: 'John Doe, Dominion Lands Agent at Grande Prairie, Alberta, reports as follows.'".

In accordance therewith,

Frederick Montizambert, C.M.G., I.S.O.; M.D. Edin, F.R.C.S.E., D.C.L., Director General of Public Health and Sanitary Adviser of the Dominion Government, Ottawa, Ont., reports as follows:—

Coast Quarantines.—At your various quarantine stations on the Atlantic and Pacific coasts, 1,460 vessels from foreign ports were inspected. Number of persons inspected, 239,125. Admissions to hospital for epidemic disease, 306. In the last year before the war the numbers were: persons inspected, 706,679; admissions to hospitals, 1,996.

These figures of the last year before the war are liable to be equalled or surpassed after it ends. The demobilization and return of our army will then take place, and the tide of immigration once more set in.

The diseases met with were small-pox, leprosy, diphtheria, scarlet fever, measles, mumps, dysentery, and erysipelas.

In every instance the disease was stamped out at the staiton, and so prevented from appearing inland.

Inland International Frontier Quarantine.—On account of the existence in epidemic form of small-pox in the state of Maine, U.S.A., it was ordered that frontier quarantine inspection against that disease be instituted at McAdam Junction, N.B., August 15. Dr. J. B. Morrison was appointed temporary medical quarantine inspector at that railway port of entry. He remained on that duty until September 30, when that temporary quarantine was raised.

Small-pox having been developed in an epidemic form in the state of Maine, and appearing especially amongst the potato reapers returning from that state to Canada,

chiefly along the Aroostook border, it was ordered that frontier quarantine inspection against that disease should be initiated. Dr. Earle, of Perth, was accordingly appointed temporary medical quarantine inspector for the international highway crossings and Aroostook County frontier on November 2, 1917. Guards under him covered the various highways, reporting to him. Owing to the cessation of the threatening, this frontier quarantine inspection has been directed to be discontinued after to-day.

Prince Edward Island, by the terms under which she entered Confederation, has the right of quarantine protection, by the Federal Government, against the other provinces of the Dominion. She is the only province that has such right. Cases of smallpox to an epidemic extent having appeared in New Brunswick, you instituted, on the request of the Government of Prince Edward Island, the quarantine medical inspection of the car ferry arriving at Port Borden, P.E.I., from the mainland on March 4 by Dr. MacNeill, your quarantine officer at Summerside, P.E.I. The car ferry itself being the all-important and only means of regular communication, the Government of Prince Edward Island requested its protection also, and in compliance you changed the inspection, causing it to be made on the trains between Sackville and Cape Tormentine. To this duty Dr. Geo. M. Cook, of Sackville, was appointed. This inspection is still being carried on.

Circulars.—Circular letters were issued from time to time to your different officers, calling their attention to the various matters during the year connected with the appearances of epidemic diseases abroad.

Bulletins, etc., received.—The weekly Public Health Reports of the United States Public Health Service have been regularly received. They are of great value, as are also the monthly bulletins from provincial, state and municipal boards of health in Canada, the United States, and other countries. The bulletins of the International Office of Public Health, Paris, have been regularly received throughout the year and spare copies distributed to the provincial boards of health.

Official visits, inspections, etc.—On the 13th of June I left to attend the annual meeting of the Canadian Medical Association, held in Montreal.

On June 27 I left for inspection duty on the Atlantic seaboard. I inspected the quarantine station at Grosse Isle, on the river St. Lawrence; the leper lazaretto at Tracadie, N.B.; the quarantine stations at Chatham and St. John, N.B.; Digby, Halifax, Sydney and Louisburg, N.S.; and Charlottetown and Summerside, P.E.I.

On August 10 I left for the Pacific coast. I inspected at Vancouver, Victoria, William Head, and Prince Rupert, and the leper lazaretto at Darcy island.

On September 26-28 I attended the annual meeting of the Canadian Association for the Prevention of Tuberculosis, and the Canadian Public Health Association, held in Ottawa.

On October 25 I attended, at Toronto, the official opening of the new laboratories of the University of Toronto.

Stations, etc., Grosse Isle, Que.—Vessels inspected and persons examined at Grosse Isle and its substation Rimouski:—

	Grosse Isle.	Rimouski.	Total.
Vessels inspected..	349	29	378
Persons inspected..	30,127	10,858	40,985

The number of persons inspected shows a decrease of 252,383 as compared with 1913.

Infectious disease occurred on eleven vessels. The admissions to hospital were 26. In 1913 they were 1,720.

These figures of 1913 are liable to be equalled or surpassed after the war.

Halifax, N.S.—Vessels inspected, 504. Persons inspected, 36,910. Admission to hospital, 1.

No serious damage was done to the quarantine buildings by the explosion on December 6, 1917.

St. John, N.B.—Vessels inspected, 185. Persons inspected, 26,002. Admissions to hospital, 2.

Chatham, N.B.—Vessels, 1 only, as against 120 in the previous year. No quarantinable disease.

Digby, N.S.—No vessels for quarantine inspection.

Sydney, N.S.—Vessels inspected, 113. Persons inspected, 4,255. No quarantinable disease.

Louisburg, N.S.—Vessels inspected, 78. Persons inspected, 3,311. No quarantinable disease.

Charlottetown, P.E.I.—Vessels inspected, 2. Persons inspected, 41. Admitted to hospital, 1.

Summerside, P.E.I.—Vessels inspected 1. Persons inspected, 6. No quarantinable disease.

William Head, B.C.—Vessels inspected, 198. Persons inspected, 127,602. Admissions to hospital, 260. Diseases: Smallpox, mumps, scarlet fever, measles, dysentery, and erysipelas. Contacts landed for quarantine of observation, 4,837.

In the handling of the 84,473 coolies who entered at this port, the military authorities established a receiving and clearing camp at the extended portion of the William Head station.

Victoria, B.C.—No vessels inspected.

Vancouver, B.C.—No vessels inspected.

Prince Rupert, B.C.—No vessels inspected.

Leper Lazaretto, Tracadie, N.B.—There are now only thirteen patients in this institution, only about half the number there were a few years ago. There are six males and seven females. Eleven are of French-Canadian (Acadian) origin, one of Icelandic, and one of Russian.

There was one death during the year, a Syrian, and one Acadian re-admitted.

Amelioration of symptoms continues to be experienced under the treatment now in use.

Leper Lazaretto, Darcy Island, B.C.—Five cases of leprosy have been admitted during the year, one Chilean-Kanaka, three Chinese, and one Anglo-Indian.

The Chilean was so much recovered as to be no longer a danger to others by October last. He was therefore released, but reports from time to time for examination, which so far has continued to prove negative.

Public Works Health Act.—The inspectors report that the general health of the men employed on the various works connected with the construction of railroads, canals, bridges, tunnels, etc., has been exceptionally good, that the general sanitary conditions of the camps have been excellent, as has also been the attention given by the various contractors and district medical officers in complying with the requirements and regulations.

Changes in Stations.—Owing to the absence or very small number of foreign vessels arriving during the last few years at the ports of Prince Rupert, B.C., Digby, N.S., and Summerside, P.E.I., it has been directed that these ports revert to the position common to all the smaller ports on each ocean. For the future therefore they will be rated amongst the Unorganized Maritime Quarantine Stations.

MISCELLANEOUS.

APPENDIX No. 2.

EXHIBITIONS.

OTTAWA, March 31, 1918.

Mr. William Hutchison, the Canadian Exhibition Commissioner, reports as follows:—

As mentioned in my report for the last fiscal year, our exhibit had been installed at the Panama-California International Exposition of San Diego since the beginning of 1917, and had proved quite successful both from the point of view of attendance and for the very extensive and free newspaper publicity secured for Canada.

At the end of the year 1916, your department had acceded to the wishes of the management of the San Diego Exposition to extend our participation there for three more months, as it was deemed advisable to take advantage of the large number of tourists who come to Southern California during the winter season. At the end of March, 1917, the exposition authorities again expressed the desire that we should continue our participation until further notice, or at least for another term of three months.

At that time the city of Los Angeles was getting ready for an exposition, which from all appearances bid fair to be a very important one. "The District Fair Association of California" was expected to open in September, 1917, on the State Exhibition grounds, which are situated almost in the heart of the city. Its main feature was to be a live-stock show, which would have included the finest specimens not only of California. but also of the whole of the Middle West.

Negotiations were entered upon between the authorities of the Los Angeles exhibition and the Canadian Government through the Canadian Exhibition Commissioner at San Diego, with a view to have our exhibit installed at that fair.

Another request of similar nature came from the management of the Merchants and Manufacturers Exchange of New York to exhibit in the Grand Central Palace, in that city, in the course of 1917. Due consideration was also given to this proposition.

While the above pourparlers were going on, it was deemed advisable to maintain the Canadian exhibit in its actual state at the San Diego Exposition—until some decision was arrived at concerning the proposed participations.

On May 11, 1917, the Canadian Exhibition Commissioner at San Diego, was notified by your department that, in view of conditions resulting from the war, the Government had decided not to have the exhibit installed elsewhere for the time being, and that no large exhibition in which we might participate being in sight, it was deemed advisable to have the exhibit shipped to Ottawa and stored there until further instructions.

We accordingly proceeded with due diligence to the packing of our exhibit, which was shipped to Ottawa; but owing to the scarcity of cars, and also the congestion of traffic existing at the time on American railroads, some delay occurred in the arrival of our goods in Ottawa. However, about the latter part of August, all our exhibits had arrived safely and had been stored in a building on Wellington street rented for that purpose by the Government.

The work of overhauling the cases and putting all the exhibits in a condition, such as would make them fit for shipment and display at a moment's notice, is being carried out by the members of the exhibition staff. The very considerable stock of our exhibition goods—which necessitates fifteen to twenty large freight cars for transportation—requires for its proper handling and maintenance, constant care and much labour. Especially may this be said regarding the upkeep of our numerous specimens of Canadian fauna. This work is satisfactorily attended to, and everything is held in readiness for the prompt carrying out of further instructions.

REPORT

ON THE

AGRICULTURAL INSTRUCTION ACT

1917-1918

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1919

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OTTAWA, November 30, 1918.

To the Hon. T. A. CRERAR,
Minister of Agriculture,
Ottawa.

SIR,—I have the honour to present herewith my report for the fiscal year ending March 31, 1918, as Commissioner under the Agricultural Instruction Act.

In this report will be found a comprehensive account of many of the leading phases of work conducted by the provinces of Canada with the assistance of the Agricultural Instruction grant, together with summary financial statements for the year under review. Other fields of work, particularly those of demonstration and scientific investigation, are not specifically dealt with for the reason that the nature of these activities, which remains much the same from year to year, has been indicated in previous reports.

I have the honour to be, sir,

Your obedient servant,

W. J. BLACK,
Commissioner.

REPORT

ON THE

AGRICULTURAL INSTRUCTION ACT

FOR THE FISCAL YEAR 1917-18.

Tabled in pursuance of Section 8 of the above named Act.

I. THE AGRICULTURAL REPRESENTATIVE SYSTEM.

In connection with the efforts of departments of agriculture to render more effective service to the farming industry in Canada, no more important step has been taken in recent years than the adoption of the agricultural representative system. For a long time it had been recognized that between the man on the land and government institutions, maintained for the purpose of helping him, there was no easy or well established line of communication.

The headquarters staff in agricultural departments has had to depend largely upon the publication of bulletins and reports and occasional lectures from the public platform to supply the men in the front line of practical agriculture with the latest information affecting their progress. Usually it has happened that the farmer has considered himself too busy in overcoming the obstacles that faced him to give attention to advice or information coming from authorities with whom he was not acquainted.

While farming is regarded as one of the most complex of all pursuits, approximately 70 per cent of the holdings have been found by investigation to be operated with but little recognition of the teachings of science or the findings of investigators in the field of plant and animal production. At the same time every other human activity, especially manufacturing enterprises, is guarded and directed by specialists whose services are regarded as indispensable and without whom success could not be achieved. The agricultural representative, a new type of public servant, is the farming specialist, the connecting link between the scientific laboratory and the man who sows, and reaps, and markets.

Just where and when the idea of having representatives of departments of agriculture, or agricultural colleges, as field workers in contact with practical farmers was first adopted, matters but little; the fact that the system has become known in Canada and is demonstrating its effectiveness is more important. It is of interest, however, to know that trained experts in agriculture known as "konsuldnt" were first employed as consulting agents, or field advisors many years ago in Denmark, when that country was organizing the system of farming by which it has become famous. A little later the idea found its way to this continent and was adopted in the southern states as a means of reaching the indifferent farmer, and, about the same time, 1907, in Canada by the Ontario Department of Agriculture in an effort to provide better extension facilities.

Since that time the value of the trained field representative of the department of agriculture and the agricultural college has become greatly appreciated by practical farmers, everywhere, who have had an opportunity of understanding the character of service that could be rendered by these officials. When the United States declared war and the importance of increasing food production had to be emphasized, a careful analysis was made of all the agencies operating in the interests of the farming industry, and it was unanimously agreed that the county agent, as the agricultural representative is known in that country, was the most effective instrument in rendering service to farmers in the production of more and better crops. At that time there were about 1,250 county agents scattered throughout the various states. At present there are 2,500 and, before the end of the present year, every one of the 3,000 counties in the Union will be covered by the system.

When the Agricultural Instruction Act was passed by the House of Commons in 1913, a marked impetus was given the agricultural representative system. To-day most of the provinces either have this branch of service well organized and running, or else in progress of organization. The character of the work being carried on varies according to the peculiar needs of the province and district in which the representative is called to operate. Usually, it is found that the most effective service is rendered by the representative who, in becoming established in a county, ascertains what the problems of the farmers are, and endeavours to render such assistance as the practical men resident in the district believe would be helpful. Particularly effective work is done where the field expert has organizations of farmers to confer with and assist him in his projects. The outline that follows will show the varied character of the problems dealt with, and the manner in general in which the work is carried on.

ONTARIO.

In Ontario the activities of the agricultural representative are so general and so far reaching in extent as to touch almost every phase of instruction and demonstration conducted under the auspices of the provincial Department of Agriculture. Nearly every county and district now has its representative and, throughout the province, agriculture is being improved and placed on a more profitable basis by this means.

One of the most important undertakings is the effort to encourage the young men on the farms and to give them a clearer insight into agricultural problems. With this in view, practical four to six-weeks' courses in agriculture are conducted each winter. Out of these classes have grown the Junior Farmers' Improvement Association. In 1914 the first Junior Farmers' Improvement Association was organized at the close of the special courses in agriculture. At the beginning of 1918 there were eighty-two such organizations with a total membership of 1,521. Briefly stated, the object is to create a deeper, more permanent and more intelligent interest in all that pertains to agriculture in its broadest sense. The movement is progressing very rapidly, and is now among the most important features of district representative work. The Junior Farmers' Improvement Association has a four-fold object in view—educational, social, research and investigational and financial. The meetings during the winter months partake of the nature of addresses, debates, mock parliaments, literature and music. During the summer, the Junior Farmers' Improvement Association in the district usually hold a picnic and conduct a motor tour through certain districts. In addition to the educational meetings the Association members take part in conducting the acre profit, live-stock rearing, live-stock judging and other competitions.

Another general feature has been the promotion of undertakings to interest and instruct country boys and girls in country pursuits. The school fair has been made use of as a means to this end. With the fair is associated the home garden plot, and the projects in crop growing and poultry rearing. Over sixty thousand children annually take part in work of this character. Judged from its commercial value alone, the result is not negligible in these days when increased food production is being urged on rural and urban dwellers alike. As an educational factor and as a means of interesting boys and girls in country pursuits its utility is far greater.

In 1917, when the Ontario Department of Agriculture put on a campaign for greater production, it was faced with the difficulty of securing labour to supply the farmers' needs. This difficulty was met in some degree by the Government purchasing 127 tractors which were put at the disposal of the farmers throughout the province, to assist in ploughing and harrowing. In adopting this policy the Government has another object in view, namely, to demonstrate the usefulness of farm tractors on the average Ontario farm.

The agricultural representatives take charge of the tractors used within the borders of their respective counties. It is their duty to secure contracts, route the machines, engage operators, and be responsible for the general supervision of the work.

These are but a few of the more impressive instances of the effectiveness of the work of the agricultural representative in Ontario. The range of work is a very wide one and nothing more will be attempted than to indicate other activities, which may be regarded as more or less general. Farmers' clubs are organized, where local problems are discussed. Live stock clubs are organized, co-operation is encouraged, including egg-circles, seed grain is distributed, seed growers' association are promoted, seed potato plots and alfalfa experiments conducted, while orchard demonstrations, drainage surveys and campaigns against outbreaks of insect pests and animal and plant diseases are carried on. Recently, the office of the representative has been called upon to help solve the farm labour shortage, and has been of great assistance in dealing with the local distribution of farm help. The Federal grant contributes about three-fifths of the money expended upon the Agricultural Representative System in Ontario

QUEBEC.

The province of Quebec has twenty agricultural representatives, or "agronomists," who have charge of thirty-seven counties. During the active season, from May to November, their efforts are seconded by nineteen assistants. The work performed by these officers is similar, in a general way, to that carried on in Ontario and certain other provinces. It includes personal visits to farmers and the giving of information and advice in regard to methods. A general supervision is exercised by the agronomist over all agricultural organizations in his district, including co-operative societies and farmers' clubs. He also aids in the organization of fairs, home or school gardens, school fairs, competitions, lectures and demonstrations. Advantage is taken of the farm visits to gather statistics as to crops and live stock; also to inspect breeding animals belonging to farmers' clubs. The information obtained in this way is compiled and sent to the department.

It is proposed that the agronomists shall render assistance in connection with the increased production campaign of 1918, and to facilitate this work, office assistance will be provided. The agronomists purchase their own motor cars, for the use of which they are indemnified when in the performance of their duties.

The department encourages the granting of a bonus to the agronomists by the county. Twelve counties have hitherto responded to this appeal, making grants varying from $100 to $600, and it is expected that in due course all will endorse the suggestion. The work is supervised by a director, and the expenses are met largely from the Federal grant.

MANITOBA.

Owing to enlistment, this phase of work in Manitoba has not been as prominent as could be desired. However, the men now in the field are demonstrating the fact that this feature of extension work is destined to be one of the most effective means of promoting successful agriculture.

SASKATCHEWAN.

Plans to develop a complete field service were under way in Saskatchewan when war was declared and heavy enlistments from the staff of the Department of Agriculture interfered. This year fifteen special representatives were selected to deal with greater production effort. Difficulty has been experienced in finding well qualified men, but the Provincial College of Agriculture no doubt will render special aid in this connection when peace is declared and normal conditions again exist.

ALBERTA.

The work of the Agricultural Representatives in Alberta is carried on chiefly as extension work from the provincial schools of agriculture, and is done in the period between school terms from April to September, inclusive. The schools of agriculture were the centers of operation in three cases and the demonstration farms in two. During the year 1917 the Department of Agriculture had five representatives in the field, engaged chiefly in the development of school fairs. School fairs were held at nine places in the province and included in all 166 schools. They affected the work of over 2,000 pupils. The number of exhibits was approximately 25,000. The results are considered excellent by the department and by the public.

In addition to the school fair work, the representatives gave aid, wherever possible, in such matters as cultivation, crops, eradication of weeds, care of live stock and the marketing of farm products.

BRITISH COLUMBIA.

In British Columbia, agricultural representatives operated with success in four districts for a period of three years previous to the beginning of the war. Since that time, the number engaged was diminished, but recently special workers have been secured to aid in the campaign for increased production.

NOVA SCOTIA.

During the past year there were six agricultural representatives employed in Nova Scotia—four of them continuously and two of them during a portion of the year. Considerable attention is given to co-operative work—the co-operative marketing of wool and potatoes and buying of fertilizers, flour and feeds.

The agricultural representatives have encouraged the use of lime as a means of improving the productive activity of the soil. They have acted as a medium between the scientific men employed at the Agricultural College at Truro, and the farmer, keeping the latter in touch with the latest discoveries and inducing him, by personal contact, to improve his methods.

NEW BRUNSWICK.

As the building up of the Agricultural Representative Staff had its inception during the year, the work of this branch of the Department was late in starting. In fact, it did not really begin until the fall.

As at present constituted, there are three groups of representatives, with a chief and assistant in each. There being a mixed English and French population throughout a considerable portion of the province, each group has one English and one French-speaking representative.

For some time after their appointments the representatives busied themselves in becoming as thoroughly acquainted as possible with the conditions in their respective districts, at the same time giving what assistance they could in the different sections visited.

During the winter months they attended and addressed greater production meetings and assisted in the organization of poultry, pig and potato clubs. Meetings were also held by them with a view to the development of the sheep industry and organization for the co-operative marketing of wool.

PRINCE EDWARD ISLAND.

In Prince Edward Island practically all of the field work of the Department of Agriculture, outside of dairying and the work in the schools, is done by the representatives, there being no special live stock and other branches as in the other provinces. Hence their duties are wide and varied.

The year opened with an agricultural representative in each of the three counties of the province; but very shortly afterwards occurred the death of Mr. M. H. Coughlin, B.S.A., representative in Kings County, and a man exceptionally well fitted for his position. The vacancy has not yet been filled.

The work of the year included short courses in stock raising, dairying, crop production and marketing, distribution of pure-bred stock, drainage surveys, and directing of seed fairs. At all times the representatives are available as consulting advisors to the farmers of the island in matters pertaining to their business. Their influence is widely felt and their advice and counsel highly regarded.

II. CO-OPERATION AND MARKETING.

A few years ago, co-operation among farmers in a business sense was almost unknown in this country, although in many countries in Europe farmers had for years been very closely organized for the production and sale of their products, for the purchase of supplies and for the financing of their business undertakings. No subject of recent years has occupied more attention on the part of those concerned in agricultural economics than the subject of co-operation, it being realized that without it, Canada could never take the place in the marts of the agricultural and industrial world that her vast producing resources entitled her to.

When Instruction Act funds became available, advantage was taken of the fact in Ontario and Saskatchewan, to organize divisions of the local Departments of Agriculture to foster organizations of associations of farmers for co-operative undertakings. In each instance a director of co-operation and marketing was appointed, the purpose being to educate the farming community as to the advantages of co-operation, and, at the same time, to afford assistance to the inexperienced so as to enable them to organize in a way that would avoid fatal mistakes at the outset, and to systematize and simplify their business transactions. In certain other provinces the instruction grant assists the promotion of co-operative enterprise in an educational way, particularly in connection with egg, poultry and wool marketing.

ONTARIO.

Ontario, in instituting the Co-operation and Markets Branch in 1914, undertook to give assistance in the organization of co-operative associations, and to render more effective the organizations that were already operating in the province. As there were some fifty organizations in existence, engaged in the marketing of fruit and other products, as well as clubs for the purchase of seed, fertilizers and similar commodities, it was felt that a great opportunity for usefulness existed for a work of this kind.

In its early stages, the work consisted mainly in investigations as to the nature of the business conducted by organizations carrying on various forms of co-operative enterprise. These included organizations for the purchase and sale of products, co-operative cheese factories and creameries, and rural telephone companies. The effectiveness of municipal markets in bringing the producer and consumer together was investigated. A book-keeping system for co-operative associations was devised, and the matter of extending credits to farmers received attention.

As a result of the investigations carried on, the conclusion was reached that very few substantial and effective business organizations existed. The inquiry led to the belief that the time was ripe for concerted action looking to the formation of such associations.

The policy governing the work of the Branch was based on these facts, and is as follows: To assist, both in the reorganization of old societies and the formation of new ones, by giving instruction in (1) methods of organization, (2) basis of organization, (3) business methods and practices.

Much effective work of this description has been accomplished.

In 1917, provision was made in the Ontario Companies Act for the incorporation of co-operative organizations. This statute affords protection to bona-fide co-operative companies and associations, and provision is made whereby capital may be raised by means of "capital notes" as well as shares.

Many of the difficulties of co-operative organizations are due to the lack of a proper basis of organization. A standard set of by-laws has, therefore, been issued for their guidance. Where associations are organized in a similar manner, co-operation is made easier among local associations and a union of associations, leading to a larger organization is facilitated. An example of this is apparent in Lambton county, where 45 farmers' clubs have united to form the Lambton County Co-operative Association. In Leeds, Brant and Oxford counties, and elsewhere, similar amalgamations have been made, and the general tendency appears to be in the direction of larger and more permanent organizations, using the local clubs as units.

The number of farmers' clubs in the province is between 300 and 400. Most of these have come into existence during the last five years. The greater number are organized simply for the purchase of supplies in wholesale quantities. As a rule they are not incorporated and business is done through the United Farmers of Ontario, an incorporated organization doing about a million dollars' worth of transactions annually.

In the fruit districts several associations have been organized, consisting of locals operating through a central company. The fruit associations have been greatly handicapped during the last three years owing to poor crops and to adverse market conditions.

Egg circles continue to make progress, six having been added during the year. The business of the circles amounts to about $250,000 annually. In the matter of live stock marketing, increased interest is apparent. Some thirty-five organizations, chiefly clubs, ship live stock to a central market. In some instances wool, lambs and

other products are shipped. The business of these thirty-five associations during the year amounted to $900,000.

The Co-operation and Markets Branch acts at times as a medium for the interchange of products among farmers' organizations, and assists in locating a market for products. The agricultural representative is usually the channel employed in assisting local organizations.

SASKATCHEWAN.

In Saskatchewan steps were taken in 1913 to facilitate the formation on a sound basis of local co-operative societies for the sale and purchase of farm products and supplies. This action had its origin partly in the conviction on the part of the farming community that the "spread" between the wholesale and retail prices was unduly great. The Saskatchewan Grain Growers' Association had demonstrated some of the advantages of co-operation, and in order to facilitate the formation of associations for the sale and purchase of commodities, an Act was passed to provide an inexpensive method of organization, with limited liability on the part of the individual members, and an equitable system of control and profit division.

A Co-operative Organizations Branch was added to the provincial Department of Agriculture and educational and demonstrational work undertaken. Informative literature was issued and addresses were delivered at farmers' conventions and elsewhere. Wherever a community of farmers showed a desire to take advantage of the provisions of the Co-operative Associations Act, advice and practical assistance were tendered, by-laws were suggested, different lines of work were indicated, men were sent to assist in the first co-operative shipment of live stock, and the difficult matter of co-operative accounting was provided for by ascertaining the simplest and best methods.

The following comparative figures will show the gratifying progress that has been made:—

	1915.	1916.	1917.
Associations reporting	102	173	309
Number of shareholders	2,850	5,537	9,444
Paid-up capital	$ 13,494.20	$ 39,421.49	$ 92,940.27
Assets	$ 37,337.53	$105,322.37	$295,012.40
Liabilities, including paid-up capital	$ 29,717.33	$ 82,956.57	$232,938.81
Associations handling supplies	70	138	308
Value of supplies handled	$239,320.42	$805,456.88	$1,984,545.85
Associations marketing live-stock	9	10	23
Value of live-stock marketed	$ 42,034.22	$150,512.76	$32,171.25
Other farm produce marketed	.....	$ 8,923.03	$15,115.80
Total turnover	$281,354.64	$964,892.67	$2,122,832.90

At the close of 1917 the number of associations registered had risen to 367.

As regards co-operative production, but little advance has been made. There is but one co-operative farm where owners and employees work on shares, while there are only two cases of community breeding, one in horses and the other in cattle breeding. It is thought that this is because of the scattered nature of the settlement of the province and the pioneer conditions that still prevail over a large section.

In addition to the assistance given in the formation and operation of co-operative associations, several special projects have been taken up as demonstrations. These include demonstrations in the handling and shipment of cattle, wool gathering, grading, and marketing, and co-operative poultry marketing. On request, a representative of the branch assists any association in receiving, forwarding and marketing its first shipment of live stock. Account forms, sufficient to record one year's transactions are supplied. Twenty-five associations reported having marketed 444 cars of stock in 1917, compared with 241 cars by twenty-three associations in 1916. Reports from these associations indicate a saving of from one-half to one and a half cents per pound having been made on shipments marketed co-operatively instead of through drovers and buyers.

Under the co-operative wool projects, 625 shipments were received from farmers in 1917, and marketed in Philadelphia. A member of the staff of the College of Agriculture took charge of the grading and storing of the wool, and after the sale had been made, each shipper whose methods had been faulty was advised as to the steps necessary for improvement. The instructional value of work of this kind is obvious.

To facilitate the marketing of poultry and to encourage poultry keeping, co-operative killing and marketing stations have been operated since 1915 at Regina and Saskatoon. The work is conducted jointly by the Co-operation Branch of the Department and the College of Agriculture.

III. INVESTIGATION.

FARM MANAGEMENT SURVEYS—SOIL SURVEYS—PLANT INTRODUCTION IN UPPER ONTARIO.

FARM MANAGEMENT SURVEYS, ONTARIO.

In 1917 the farm department of the Ontario Agricultural College continued its investigations regarding farm management. The work is under the direction of the lecturer in farm management, A. Leitch, B.S.A., and was for the purpose of studying the factors that have the greatest influence in increasing or decreasing the net income of the average farm. Itemized records were obtained of one year's business transactions on 113 farms in Caledon township, Peel county.

The findings of the survey, thus far, may be summarized as follows:—

1. The size of the business on the small farm engaged in general mixed farming is too small to pay all expenses and leave more than a very small labour income for the operator.

2. High profits from live stock have a greater influence on the labour income than have high crop yields.

3. The quantity of the live stock determines the amount of feed that may be fed profitably. Heavy feeding to stock of low quality means a loss rather than a gain. In order that the crops grown may be fed upon the farm to keep up the soil fertility, and at the same time yield a profit, the quality of the stock on a great many farms must be improved.

On the 190 farms visited in Caledon township were found the following proportion of pure-bred and grade sires:—

	Pure Bred.	Grade.
Draught horses	4	0
General purpose	1	8
Light horses	0	3
Beef cattle	20	16
Dairy Cattle	1	17
Sheep	13	132
Swine	3	1

A second farm-management demonstration survey has been carried out under the same auspices. The work has been done in the county of Oxford, where farms have been selected to represent average dairy farm conditions in Western Ontario. Parts of seven townships were covered, including 430 farms, which is about one-fifth of the farms in the territory covered. A similar survey will soon be commenced in the county of Dundas, where conditions representing average dairy farming in Eastern Ontario will be exemplified. It is the purpose of the Ontario Agricultural College to repeat these surveys annually in these districts for five years, and to deal with other districts and other conditions of farming. The Caledon township survey was carried on with funds provided under the Agricultural Instruction Act. The later surveys

are being financed with provincial funds apart from the salary of Professor Leitch, which will continue to be drawn from the Agricultural Instruction Act appropriations.

EXPERIMENTS WITH FRUITS AND VEGETABLES IN UPPER ONTARIO.

The Northern Ontario Plant Breeding Station is located on the Provincial Industrial Farm, nine miles southwest of Fort William. The Department of the Provincial Secretary, which administers the Industrial Farm, supplies the use of the land, greenhouses and accompanying buildings, unskilled manual labour and horse labour; the Department of Agriculture directs the work, employs the trained men, and supplies the special machinery and appliances necessary, meeting the cost from Instruction Act funds.

The leading object of the work is to ascertain what fruits, vegetables and ornamentals, now available in the trade, will thrive in the northern districts of the province. Another interesting and important feature is the improvement and propagation of wild native plants and their use with domestic strains in breeding up a hardy pomology and satisfactory horticulture for the vast extent of country north of the Canadian Pacific railway.

Some preliminary work was undertaken in 1916. In 1917, the work was placed under the jurisdiction of the Fruit Branch of the Department of Agriculture and reorganized on a larger scale, with a graduate of the Manitoba Agricultural College in charge.

In 1917, the plantings in the garden included commercial varieties of all vegetables, and many varieties of bush fruits and strawberries. In the fruit-tree plantation apples, pears, plums, and cherries have been set out. In the nursery were planted standard and seedling apples, and shade and ornamental trees and shrubs of species deemed suitable for the country, together with forest-tree seedlings.

Bush and cane fruits and strawberries find these regions generally congenial. They will be propagated as rapidly as possible for general distribution. Varieties of fruit trees that are proving satisfactory will be propagated and furnished to experimenters. Vegetable seed from selected strains will be grown with a view to supplying farmers with types specially suitable for the climate. Plantations of the different native fruits of promise will be set out in order that their variation under cultivation may be observed. Experiments and demonstrations will be made in plant propagation, plant protection, and in the storing of roots and vegetables.

A suitable site has been placed at the disposal of the station for demonstration work with ornamentals. In this plantation the qualities of native shrubs and trees will be compared with those of introduced species.

ONTARIO—SOIL SURVEY.

Soil survey and soil demonstration work has for some time been receiving the attention of the chemistry department of the Ontario Agricultural College. The province from Windsor as far east as Kingston, has been covered in the preliminary survey, and a great variety of types of soils have been found.

Samples of soils of various types have been taken and analyzed. Demonstrations plots on some of these types have been started and are giving interesting results. For instance, the increased yield of mangels on plots treated with fertilizers was from 75 to 90 per cent greater than on the manured but not otherwise fertilized check-plots. A number of experiments with lime and phosphates are being carried on. These apparently are the two mineral constituents most needed by Ontario soils.

NOVA SCOTIA—SOIL SURVEY.

The systematic survey of Nova Scotian soils, from the chemical standpoint, is being prosecuted by the chemistry department of the Nova Scotia College of Agricul-

ture. Two of the more important agricultural districts, namely, the Stewiacke and Margaree valleys, have recently been visited and representative samples have been taken from the various soil-types in these districts. Special attention is being paid to the question of soil acidity, and where lime has been recently used an endeavour is being made to ascertain what benefit has accrued, if any.

Fertilizer Investigations.

Another line of work is to investigate local sources of materials which may be added to increase the productive power of the soil. To this end many rocks, mud, swamp deposits, fish-waste and fertilizers have been analyzed.

After two years of field work, the investigators are convinced that for increased soil fertility, the material most available in that province is limestone. Many farmers report increases of from one-half to one ton of hay per acre, and better clover and turnips, from the use of ground limestone.

Fertilizer Demonstrations.

In order to make extensive tests of the value of limestone, the department, last year, selected Margaree, a point in Cape Breton, away from railway transportation, hired a limestone crusher and sent it to this point. Over 1,000 tons of limestone were crushed during the season, and this will be used under varying conditions for the purposes of demonstration and the securing of further information as to its value.

To determine the value of raw rock-phosphate, by way of comparison with acid phosphate, a car of it was imported in 1917 from Tennessee. This is being tested at Truro, Nappan, and Kentville.

IV. WOMEN'S WORK.

WOMEN'S INSTITUTES—HOMEMAKERS' CLUBS—HOME ECONOMIC SOCIETIES.

The aid to women's work under the Agricultural Instruction Act has been given in acknowledgement of the difficulties and disadvantages associated with domestic life on the farm and in response to the needs of farm women. It was realized that to concentrate on the improvement of agriculture and at the same time neglect the improvement of home and social life would be a one-sided arrangement. Instruction that would enable women to make their homes healthier and their lives brighter was urgently needed. The demand was insistent for practical information—information that should be brought right home to women through the medium of ocular demonstrations, lectures, bulletins, motion pictures, and all other available means.

The burden of domestic work falls heavily on the women of the farm. Overwork is a common and widespread complaint. The farm woman can get no help for herself, and the help her husband has she must provide for. Lack of modern labour-saving devices, of modern heating, lighting, water and sanitary systems, add to that burden. The farmer in the labour shortage is aided by information as to labour-saving devices. His wife asks for similar assistance.

Not only does the farm woman require help in her work, but she also needs aid in finding outside diversion. Being constantly employed with tasks of a routine nature, she is confined to her home, and has few opportunities for social intercourse with her friends and neighbours. Under such conditions she often suffers from isolation and loneliness and the improvement of herself and her children become difficult.

The work carried on in the interest of women by provincial departments may be broadly stated as having for its object the betterment of living conditions on the farms.

In every province the work has been greatly assisted, if not entirely financed, from instruction funds, whether conducted under the auspices of women's institutes, home economic societies or homemakers' clubs. Since the war began patriotic efforts have to a large extent engrossed the attention of the membership of these organizations, but, on the whole, the programme of instructional work has been carried out, and the attendance at gatherings of this description has been satisfactory.

ONTARIO.

In Ontario at the time the Agricultural Instruction Act was passed, women's institutes had long been in existence. When the grant became available, it was made use of to finance demonstration lectures in household science and related subjects. Demonstration lecture courses in sewing, food values and cooking were systematically carried on among the 900 women's institute branches, having a membership of approximately 30,000.

In addition to these courses, many demonstrations have been given since the outbreak of the war on the canning and preserving of fruits and vegetables, war breads, etc. Demonstrators for this feature of work were sent to 175 places with an agreegate attendance of 15,580.

A number of centres asked for canning demonstrations at the fall fairs. Equipment was provided and demonstrators sent to Toronto, Ottawa, Picton, Peterborough, Windsor, and other places. In connection with the campaign for food conservation, community canning centres have been established at various points.

The carrying on of medical inspection in the rural schools is becoming an important feature of institute work. Reports from the schools indicate that the children and the schools in the rural districts need more attention than they have received hitherto. In one county, out of twenty schools, only two were properly lighted. The seating was good in four; for the remaining sixteen the child had to fit the seat rather than the seat fitting the child. Only two were properly ventilated. Upon examining the children 38 per cent had defective vision, 28 per cent had nose and throat trouble, 75 per cent had defective teeth, and 5 per cent had poor hearing. Following the inspection, clinics are held in some places, sometimes in a church, a townhall or a private home. Two doctors and two nurses are usually employed. The department provides a doctor to do the inspecting and assists the institute in financing the clinic.

The object of the department is to demonstrate the great need for medical inspection and to create public opinion in its favour, so that by and by some practical and not too expensive method may be adopted for inspecting the whole of the province.

In adition to the above special features of work, the members of the institutes, made up largely of farm women, take a keen interest in the lighter forms of agriculture, especially fruit-growing, poultry-raising, gardening, bee-keeping, dairying, etc., many of the members taking advantage of the joint meetings held under the auspices of the women's institutes and the boards of agriculture during the winter months to secure information bearing upon the above lines. The women and girls on the farm have had to accept a larger responsibility in the work of production, although they could ill afford the time from their arduous household duties.

QUEBEC.

Organization among the farm women of the English-speaking portion of the province of Quebec is now carried on under the direction of the School of Household Science, Macdonald College, assisted by funds derived from the Instruction grant.

The year 1917-18 has been for the Quebec homemakers' clubs one of marked activity and progress. War work and food conservation were given marked promin-

ence. The clubs recognized as never before the importance of their object not only in respect to the home and community, but to that larger collection of homes and communities, the nation.

The school-fair work, which in the long run will greatly help to keep boys and girls on the farms by arousing their interest in and creating a greater respect for the professions of home-making and agriculture, received even more than its usual share of attention—many of the clubs assisting with the prize list and doing their utmost to encourage the children to exhibit at the fairs. The Macdonald College demonstrators to the Quebec homemakers' clubs, co-operating with the Government demonstrators and the Macdonald College demonstrators to rural schools, gave nearly four months of their time to this work. Sixty-eight practical demonstrations in bread-making and canning were given to the schools at various centres throughout the province. The total number of lectures and demonstrations given by the demonstrators of the extension department was one hundred and forty.

YOUNG WOMEN'S CLUBS.

(Cercles de Jeunes Fermières.)

In Quebec province generally, clubs are being organized under the Department of Agriculture for the benefit of the young women of the rural districts. These clubs form the medium for instruction not only in home subjects, but in gardening, bee-keeping and poultry-rearing. Four-day courses in household science are given, two sessions being held each day. The subjects taken up are sewing, food, lodging, canning, and agriculture for women.

MANITOBA.

The home economics societies in Manitoba are under the supervision of the superintendent of Agricultural Extension. During the year the number increased from eighty-four to ninety-eight, with a membership of 3,950.

The extension service co-operates with the societies in holding four-day short courses in dress-making, millinery, home-nursing, cookery and canning. Two hundred and seventeen of these courses were held during the year, at which there was an average enrolment of twenty-four for each course, or over 5,000 for the province. As in other provinces, much of the attention of these societies has, since the war, been taken up with patriotic work. However, a number of societies have not failed to keep up demonstration work. Much good work is being done by the members, through the assistance they are rendering to all phases of rural life including the school, the church, boys' and girls' clubs, and rural co-operation.

At the annual convention held in Winnipeg in February, 1918, 125 delegates from 66 societies were present. The convention lasted for three days.

Considerable attention is given by the home economics societies to boys' and girls' club work. Almost every club has a home economics society member on its directorate. Their efforts have not been confined to work in which girls are interested but they have encouraged chicken, pig and calf-rearing contests as well as assisting in the raising of funds for school fairs.

The home economics societies have co-operated with the health department in assisting the school nurses, and have consistently advocated medical inspection in the schools. In a considerable number of cases they have lent their assistance in beautifying the school premises both inside and out.

An increasing number of home economics society members are serving on school boards, and through them have succeeded in effecting many changes which are a direct benefit to the school children.

SASKATCHEWAN.

The homemakers' clubs of this province are carried on as a division of the extension service of the College of Agriculture of the University, and are in charge of a director.

The nature of the work undertaken by each club depends largely on the needs of the women themselves, and on the needs of the community. The principal activities are in connection with patriotic work and short courses. Speakers and demonstrators are sent out as asked for. All the clubs are interested in home problems and are anxious to get the young people interested also. Much has been done towards encouraging school-gardening, improving school-grounds and school sanitation and in starting community libraries and reading-rooms.

The homemakers' convention is perhaps the greatest event in the life of the clubs. This gathering is held at the university and the delegates are accommodated in the residence as far as possible. The railway expenses are paid and a small allowance is made towards living expenses.

There are at present 192 clubs, with an approximate membership of 5,100. Total number of meetings held during the year, 2,280.

The clubs have raised $75,000, or thereabouts, for patriotic purposes, and have made 27,000 articles for Red Cross and like activities.

Almost generally the club women have interested themselves in the work of food conservation and food production. It would seem that wherever homemakers' clubs have been established medical inspection of schools and proper medical attendance for the people has been and is being looked after. Rest rooms and club rooms have been established where deemed necessary, while almost every club manages a school fair, giving particular encouragement to children's farm and garden products. Forty-seven university circulating libraries are in circulation.

During the year the extension department provided twenty-seven short courses (from one to four days' duration), at which there was an aggregate attendance of 2,950. At eleven of these places special meetings were held for school children. These courses comprised courses in sewing, foods, and cookery and hygiene. The work in foods and cookery was mainly along conservation lines.

The homemakers' clubs hold their annual convention in the month of June. The attendance at the last was over 300. A girls' convention was held last June, at which the attendance was 75. The course given them included food and cookery, household management, health and hygiene, discussions on libraries and reading and girls' club work.

ALBERTA.

Women's institutes in Alberta have made rapid progress and are now organized practically throughout the province. The year was one of much activity, the work being largely influenced by the conservation propaganda appropriate to war conditions. One hundred and sixty short courses were held at points distributed throughout the province, with special reference to the needs of outlying districts, such as the Peace River. The courses included home-nursing, first aid, and conservation of child life. Canning and war-time cookery were given a prominent place. Bulletins on canning, on the care of babies, and on food and cookery, were published in issues of ten thousand in each case.

BRITISH COLUMBIA.

In former years the Instruction grant to British Columbia assisted in meeting the outlay on women's institutes, but in 1917 the work was financed entirely from

provincial appropriations. In certain districts the institutes have been instrumental among other lines of work in securing improvement in rural school conditions, in regard to equipment and surroundings and in connection with school gardens.

THE MARITIME PROVINCES.

In Nova Scotia and Prince Edward Island, women's institutes date from 1913. In New Brunswick a somewhat earlier start was made, but in all three provinces the movement owes its development largely to the Federal grant. In each case a superintendent is provided, and the lines of work taken up are very similar to those followed in other provinces, including short courses, lectures and demonstrations, and the holding of an annual convention. Great interest has been taken in rural-school improvement, in patriotic work, and in food conservation. In each of the Maritime Provinces a small grant is given to each institute, to assist in financing.

V. ELEMENTARY AGRICULTURAL EDUCATION.

AGRICULTURAL TEACHING IN PRIMARY AND SECONDARY SCHOOLS—HOUSEHOLD SCIENCE—TEACHER TRAINING—HOME AND SCHOOL GARDENS.

ONTARIO.

In Ontario, where 45 per cent of the school population is enrolled in the rural schools, the educational authorities regard the rural school as constituting one of the most urgent educational problems of the province. The training of teachers in agriculture at the Agricultural College, the teaching of agriculture in the schools, the encouragement of school and home gardens, and the development of the rural-school fair by the agricultural representative, are all tending to modify the course of study formerly followed exclusively in rural schools, and to adapt it to the needs of rural life.

The money allotted to elementary agricultural education in the province under the Agricultural Instruction Act is used in various ways, but the chief object kept always in mind is, that the best results will be obtained by employing it to bring about directly the actual teaching of agriculture in the schools. To accomplish this, a part of the money is used in the training of the teacher, another part in payment for actual equipment to be used for instruction, another for the work of special inspection, and still another to boards and teachers for managing school gardens.

In Ontario, agriculture and nature study are two distinct subjects. Recognition is given only to organized elementary agriculture, begun when the pupil enters the fifth grade of the public school, and carried on in connection with school gardens and other projects, through the eighth grade. The teaching of agriculture is optional, whereas nature study is obligatory.

With respect to the methods of management of agricultural classes, text-books are not studied. It is regarded as essential to success that the work should be made practical and deal with things rather than with books. A teachers' manual to be used in assisting and guiding the teacher in regard to knowing what kind of material to use and how to use it, has recently been published. The manual is for the use of the teachers and not for the pupils. However, by way of reference, extensive use is made of books, bulletins and periodicals.

Agriculture in Public and Separate Schools.

The introduction of agriculture as a regular subject of the public school curriculum is proceeding quite rapidly. Many of the difficulties which formerly appeared

great, are being overcome. Wherever the subject has been carried on for a year or two, confidence is manifested in its usefulness, not only as a subject fruitful of practical results, but also as a subject contributing towards a liberal education.

In 1917, 950 public and separate schools qualified for grants. Comparative figures are given in the following table:—

Year.	No. of Schools.	With School Gardens.	With Home Gardens.
1913	159	....	....
1914	264	208	56
1915	407	222	185
1916	585	324	261
1917	950	550	400

	No. of Teachers with Agricultural Certificates.	No. of Teachers with Second-class Certificates.
1915	100	307
1916	201	384

Agricultural Secondary Schools.

Twenty-two secondary schools conducted classes in agriculture in 1916, with about 600 pupils. To promote the teaching of agriculture in the secondary schools, allowances are made to boards for the purchase of equipment, and to the teacher for conducting the work.

The chief difficulty met with in introducing and maintaining classes in agriculture in the secondary schools is the lack of legally qualified teachers. Another draw-back is that Ontario universities have not yet seen their way clear to give some recognition to agriculture as a preparatory subject for entrance into the universities.

Three high schools—Whitby, Drayton and Oakville, have introduced separate departments of agriculture. Whitby has also added a course in farm mechanics. Two other schools are planning to commence agricultural work in 1918.

Wherever a department of agriculture has been introduced, extension work is being done. This movement contemplates the introduction of winter short courses designed to meet the needs of country people. To this work it is intended that the whole staff of the high school shall contribute so that subjects other than those considered as strictly agricultural may be taken up. By this means it is proposed to extend the advantages of the high school to the surrounding country.

The practical value of the extension work is well illustrated by the campaign against late blight of potatoes conducted in 1917 by the Drayton High School. The knapsack sprayers owned by the school were employed to demonstrate the value of bordeaux mixture in overcoming this disease which threatened considerable damage to the crop. Demonstrations were given on several farms, and in other instances, farmers were allowed the use of the sprayers. "The work done in the neighbourhood may easily have saved more potatoes than would pay the cost of the school, and the gain is not for one year alone, because when farmers see the advantage they are eager to profit by it."

Teacher Training.

The Education Department aims to maintain a strong course in agriculture in the Normal schools in order to make the teaching of agriculture effective. The special object of the course in agriculture is to prepare the teacher-in-training to train pupils for farm occupations, and to broaden and deepen their interest in nature and their sympathy with rural life.

The following topics, with some attention to methods of teaching the subject are taken—dairying, poultry, breeds of farm animals, field crops, horticulture, birds and insects, experimental plots, school gardens, home projects, and care of school-grounds. To procure special equipment for teaching these topics, use is made of the funds supplied by the provisions of The Agricultural Instruction Act.

Teachers' Courses.

A summer course in agriculture for teachers is held each year by the Department of Education at the Ontario Agricultural College.

The actual travelling expenses of the teachers in attendance are allowed, in addition to $25 for the cost of board and lodging during the preceding summer session, provided the teacher has completed the summer course leading to a certificate in agriculture and has given satisfactory instruction in agriculture during the past school year.

The number in attendance at the teachers' courses, in 1917, as compared with previous years, is given in the following summary:—

Year.	Elementary.				Intermediate.				Total.
	Part 1.		Part 2.		Part 1.		Part 2.		
	Men.	Women.	Men.	Women.	Men.	Women.	Men.	Women.	
1911	8	75	1	16	.....	.....	.....	.....	100
1912	16	65	2	23	.....	.....	....	.....	106
1913	14	64	5	36	23	4	.....	.....	146
1914	8	55	5	27	13	4	14	.....	126
1915	15	39	5	18	17	1	9	1	105
1916	11	99	9	31	15	3	14	1	183
1917	15	138	7	81	9	1	13	2	266

The Inspector of Elementary Agricultural Education supplies the following particulars as to the summer courses of 1917:—

During the term a course of ten lectures was given by Mr. H. Foght, specialist in rural education of the Bureau of Education, Washington, on the following subjects:—

1. The rural problem analysed in relation to its educational, social, and religious elements.
2. Institutional means for remaking rural life.
3. The farmer's wife, a vital factor in the problem.
4. The teacher and community leadership.
5. The complete rural community school (illustrated).
6. Good roads and education (illustrated).
7. What every teacher can do for the advancement of vocational education (illustrated).
8. The teacher and the play-life of the school (illustrated).
9. The meaning of modern sanitation in school and home (illustrated).
10. The revitalized course of study for rural schools.

School and Home Gardens and Projects.

Of the 950 schools conducting classes in agriculture from 550 to 600 have school gardens. The educational authorities state that considerable progress is being made. In the rural districts, a disposition is shown to provide what is needed in the way of land and equipment wherever the value of the movement is made clear. In the spring of 1917, increased food production was emphasized. Instead of growing flowering plants, many of the gardens, following the recommendation of the Education Department, devoted the school plots to food crops such as beans and potatoes. As a result

of the increased interest thus created, a number of schools undertook gardens for the first time, while the various home projects were enlarged upon. The cultural processes were performed as a part of the regular class work in agriculture. At the New Liskeard Continuation School the agricultural class grew one acre of potatoes thereby utilizing the work of both boys and girls to add to the production of food. At the same time the physical exercise obtained was of no less value than if secured in a costly gymnasium. The educational value of the work is of importance, while the out-door classes are no more difficult to manage than classes in the school room. The home project is also useful from an educational point of view. It takes a variety of forms, including poultry, calf and pig rearing, but the commonest is the home garden. Some 152 schools featured food production in 1917 in connection with teaching work.

Household Science and Manual Training.

A movement is under way in the province of Ontario to extend the teaching of household science to the rural schools. In order to promote the introduction of manual training and household science into these schools successful attempts have been made to overcome the difficulties that have hindered progress in this direction such as limited accommodation and resources. Substantial grants are now being offered to assist school boards to purchase equipment, and equipments have been designed that take up but little space in the one-room school. These equipments vary in cost from $40 to $75 and are provided almost entirely from the government grant.

In urban schools the children are able to go home to lunch but in a large number of country schools this is not the case, and in many of them the composition of the lunch and the conditions under which it is eaten are conducive neither to sound physical development nor to effective mental work in the afternoon.

In the United States it was found that the percentage of physical defectives as disclosed by the draft was seven per cent higher from rural districts than from towns and cities. This may be attributable in part at least to the conditions under which the noon-day lunch is eaten. No statistics are available for Canada but it is probable that somewhat the same conditions exist.

In order to remedy such conditions the provision of one hot dish such as a bowl of soup, or a cup of cocoa to supplement the cold box-lunch is advocated. This is not only a good thing in itself but it affords an introduction to more formal lessons in household science. It is not a difficult matter for the rural school child to bring a tomato, a potato or an egg, and these contributions are combined. When properly organized the lunch can be prepared without any appreciable loss of school time. The older girls, and boys too, take a delight in doing this work and get some useful training while doing it. Where the school possesses a large table, it can be set, and the lunch eaten in an orderly manner, or each desk may be set as one unit of a table. In this way the lessons in manners may be given a decidedly practical turn.

In Saskatchewan, where this movement has been in existence for some time, there are 150 schools where the hot dish is served at noon and the unanimous opinion of teachers, parents and inspectors alike is that the health of the children is improved, and that the afternoon work is made more effective.

The household science instruction does not consist of cooking only but also includes lessons in cleaning, general household management and sewing. The sewing is taught from the lowest grades, and for the older girls consists in the making and repairing of simple garments. The immediate object aimed at is to install this work in at least six schools in each inspectorate. These schools will then serve as object lessons, and from them the work should spread throughout the country.

Manual training for boys consists in teaching simple mechanical drawing, and of the use of tools in making articles for the farm and the farm home, such as feed

troughs, hen coops, chicken houses, dog kennels, hen roosts, gates, milk stools, wall shelves, hat racks, foot stools, benches, towel rollers, etc. Mending, repairing and the preservation of farm implements also receives attention. Locks are repaired, latches are mended, broken harness is put into workable shape. The importance of keeping the material equipment of the farm in thorough working order is stressed, and all the work is connected with the requirements of actual life. A new scheme of grants in aid of this work has recently been devised and it is hoped that these will lead to a rapid extension of the subject throughout the schools. A manual, well illustrated by drawings and photographs will be prepared, giving full instructions to teachers regarding organization and methods of work, and this it is hoped will remove some of the natural hesitation now felt by teachers to take up this work.

Education of this type is both cultural and practical. It not only prepares for work on the farm and in the farm homes but vitalizes the curriculum, and lays the foundation for higher industrial and technical education. The inspector gives all the help possible to schools desiring to introduce these practical subjects, and is available at all times to confer with trustees and teachers, and to address organizations anxious to promote the introduction of these subjects and to make them directly applicable to the peculiar conditions of particular schools.

QUEBEC.

The official programme of the Roman Catholic schools of the province of Quebec prescribes the teaching of the elements of agriculture from the third to the eighth year, inclusively. The teaching is based on the official text book on agriculture assisted in some cases by the school museum and, very generally, by the school garden. Some twenty thousand pupils perform school or home garden work, the department distributing seeds and plants to pupils and issuing cultural directions. In 1918, the extension of home gardening is proposed in order that school children may assist in the greater production movement.

The school inspectors are given instruction in general agriculture, horticulture and poultry work at special short courses, held for the purpose. Instruction to teachers is given by the inspectors at teachers' conventions. The inspectors also deliver lectures at primary schools to promote school gardening.

In the twelve Normal schools, the official manual of agriculture is the basis of lectures. At all the Normal schools a demonstration garden is provided, and attached to many is a model poultry plant. Instructors of the Quebec Department of Agriculture give demonstrations in horticulture, fruit growing and poultry rearing to the students.

The best agricultural teaching in the primary schools is claimed to be based on the gardening movement, which has been systematically developed and is now quite general, there being in 1917 no fewer than 850 school gardens cultivated by 20,000 children. In this development Instruction Act moneys have greatly assisted. Boys' and girls' clubs and school fairs have been the logical outcome. The school and home garden movement is under the direction of a special officer attached to the Department of Agriculture, assisted by the Horticultural staff and the agricultural representatives.

Household Science.

Domestic science is taught in many convents of Quebec. Fifty-one of these institutions, under the management of nuns of various orders, each receives from the provincial Department of Agriculture, from funds provided under the Agricultural Instruction Act, a yearly grant provided that such institutions give a domestic science course officially recognized of good efficiency, and that they make a full report of their

work three times a year to the Department. These domestic science schools are visited each year by a special inspector who judges their work by the competence of the superintendents and the practical work of the pupils.

Three other domestic science schools, also subsidized by the Department of Agriculture, work under the direction of lay teachers and give excellent results. They are: The Domestic Science School of Macdonald College, Ste. Anne de Bellevue, the Provincial Domestic Science School, 14 Church St., Montreal, and the Domestic Science School of Shawville, Pontiac county.

All the Quebec domestic science schools are under competent direction, being managed by women regularly qualified and well trained in the teaching of domestic science. The total number of pupils is 7,439.

Two of the religious schools undertook during the summer vacation to give a short course in domestic science. They were the schools of Mont Joli, Matane county, under the direction of the Sœurs du St. Rosaire and of St. Georges, Beauce county, under the direction of the Sœurs du Bon Pasteur. The lessons and practical demonstration given lasted five consecutive days at each place. There was an average attendance of 150 persons at each lesson and practical demonstration.

Elementary Agriculture in Protestant Schools.

In the Protestant schools of Quebec, 93 per cent of the children are in the elementary schools, and half of these are in rural schools. Agricultural instruction, therefore, has a vital relationship to the lives of half of the Protestant children. This fact has been recognized by the Council of Public Instruction, and a strong course in nature study has been authorized for the first eight grades. The course includes two lessons a week for each class throughout the year. The Council of Public Instruction has under discussion the question of advanced agriculture for high school grades.

Macdonald College has taken the important step of declaring that one of the requirements for matriculation into the faculty of agriculture shall be the passing of an examination in nature study and elementary agriculture. For those who did not have an opportunity of passing this in the school-leaving examinations, special supplementary tests will be held at the college on entrance.

In 1915, a rural school department was created at Macdonald College with the object of assisting the rural Protestant schools in the study of agriculture. This movement, while independent of the regular educational authorities, is countenanced and approved by them.

Home and School Gardens.

There are few gardens now successfully conducted in connection with the Protestant schools. Many of those attempted have been abandoned because of the difficulty of caring for them during the summer months. It should be remembered that the rural Protestant population of Quebec is scattered and the schools have small enrolments. In addition, some of the more isolated sections are unable to secure trained teachers through their inability to pay for them, although the number of teachers without diplomas is being rapidly reduced, there being 80 fewer than in the previous year. Home gardens, however, have been very successful. Two demonstrators connected with Macdonald College spend their whole time in directing this work, and in organizing school fairs. Several visits are made to each school. The work is explained, the seeds and other materials are distributed, the gardens are inspected, and the school fairs are judged. These projects and school fairs have caught the interest of the pupils, parents, and school trustees. More successful work of an agricultural nature has resulted from this scheme than from the previous school gardens.

Teacher Training.

Protestant teachers in training receive instruction in nature study and agriculture at the Macdonald College. It was found, however, that a large number of Protestant teachers had not had the benefits of these studies, and in 1915, summer courses were inaugurated. A bonus of $15 and a mileage allowance are paid to each student who succesfully completes the course and is awarded a certificate. In addition, two demonstrators are employed to go from school to school showing teachers how to teach the subject. With this they conveniently combine the school fair work.

SASKATCHEWAN.

In Saskatchewan, school agriculture is under the supervision of an Agricultural Instruction Committee. The committee is composed of the following: The Superintendent of Education, the Deputy Ministers of Education and Agriculture, the Dean of the College of Agriculture, the Director of Agricultural Extension and the Professor of Agricultural Engineering of the College of Agriculture, the principals of the two Provincial Normal Schools and the two Directors of School Agriculture. The Directors of School Agriculture and a Directress of Household Science were appointed early in 1915.

Ever since the province was first organized nature study has formed a part of the public school curriculum and has also been taught in the normal schools. Agriculture and nature study appear in some form in the course of study for each grade of the public school and are compulsory in the examination to qualify for entrance to high schools and collegiate institutes. In the public schools the work consists of nature study, school gardening and elementary agriculture.

High School Agriculture.

The teachers of the natural sciences have hitherto been responsible for agricultural instruction in high schools. This was regarded as not being altogether satisfactory, and an effort is being made to encourage more young men to prepare themselves for educational work in agriculture by taking the B.S.A. course of the College of Agriculture in addition to the regular professional training.

With a view to encouraging boards of trustees to provide for agricultural instruction in the secondary schools of the province, a grant of $500 is offered to any high school or collegiate institute district which makes provision for a special course in agriculture under the department's regulations.

Household Science.

In the autumn of 1914, a director of household science was appointed to the staff of the Department of Education and paid from the instruction grant. Saskatchewan is the first province in the Dominion to take this forward step. The duties of the director include the supervision and direction of the work of teachers in training in the normal schools, the inspection of the work of high schools, and the extension of household science to the schools in rural communities.

Previous to 1915 the teaching of household science was almost entirely confined to the city schools. During that year the effort was first made to extend this work to the rural communities. Through the medium of teachers' conventions and institutes, teachers have been urged to teach sewing and sanitation, and, wherever practicable, to have the pupils prepare for themselves each day one hot dish to supplement the cold noonday lunch. Some phase of household science is now being taught in about one-third of all the town and village schools of the province.

Training of Teachers.

Provision is made for the training of teachers for agricultural instruction in the Regina and Saskatoon normal schools, the College of Agriculture and the summer school for teachers in elementary agriculture and science. A director of school agriculture has charge of the work at each of the normal schools. At the Saskatoon School the dean and the professors of the College of Agriculture assist the director by lecturing to the normal school students on their special subjects. At Regina a similar course is undertaken by the director, assisted by the curator of the Provincial Natural History Museum and the superintendent of the Dominion Experimental Farm at Indian Head. No special certificates for agricultural instruction are given to teachers because of their normal school work, but a diploma is given to those who satisfactorily complete a two-year course at the summer school held at the College of Agriculture of the University of Saskatchewan.

The return railway fare of all who satisfactorily complete the summer school course is paid by the Department of Education from Instruction Act funds, and students are provided with residence at the university at the rate of one dollar per day.

Special attention is given to the training of teachers in household science, two specialists having been engaged to give the necessary instruction in the normal schools.

Rural Education Associations.

A number of rural education associations have been organized throughout the province with the assistance of the directors of school agriculture. These associations consist of teachers, trustees and others interested in educational and social work. They take local control of school fairs, boys' and girls' clubs and contests, and social service work generally.

BRITISH COLUMBIA.

In British Columbia elementary agriculture is regarded by the educational authorities as occupying a dual position in the training of boys and girls, (1) for its own sake as a preparation for practical work in farming, (2) for the broader educational or disciplinary value. In the lower grades the latter aim is obviously most important and the former merely incidental, while in the advanced and high-school grades the order is reversed and the scientific and economic viewpoints are uppermost. In the lower grades the work begins as an intimate personal study of environment, more or less informal in its character and closely adapting itself to those interests that predominate in the developing child mind. In other words, the study of the forms, forces and relationships of the child's natural environment afford the logical of proper basis for further advancement along the line of agricultural studies. In this sense elementary agriculture is merely applied nature study. The school or home garden quite naturally becomes the place and also the means whereby much of the application takes place. The garden provides that great essential in elementary education, namely, constructive and purposeful activity.

The agricultural work of the public schools, which includes the entire programme of nature study and school gardening, is the logical antecedent of a more scientific study of agriculture in high schools. It is only recently that any provision has been made in connection with high school courses of study in British Columbia to meet the needs of those who aim at making agriculture a life study or a life-work. At the present time the students in attendance at nine high schools have been given this opportunity of taking up the scientific study of agriculture. It is expected, however, that in the near future other schools and other districts will have these agricultural courses established, and that before many years have passed provision will be made

for the study of agriculture in all districts in British Columbia where the practice of agriculture is, or may be, of great importance.

The department now employs six district supervisors to give instruction to high school agricultural classes. These officers also superintend rural science work in the territory adjacent to the high schools having agricultural classes, visiting the public schools and directing nature study and school garden work.

A course of study intended to cover at least two years in the high school has been prepared and is now being followed out in these schools. It includes the study of soils, fertilizers and drainage, fodder, grain, and root crops, vegetable and flower gardening, fruit-growing, animal husbandry and poultry-keeping, dairying and bee-keeping, farm accounting and marketing, farm mechanics (for boys only), and special practice in the purchase and preparation of food (for girls only).

The course as planned is presented in the most practical and scientific manner possible, emphasis being placed on first-hand studies by the students themselves in the laboratory and experimental garden. This "concrete" and practical method of study is still further practised by having the students take occasional class periods to visit convenient farms, orchards, or poultry ranches, where under the immediate direction of their instructors they observe and record in their note books important points brought out in this outdoor lesson.

Teacher Training.

Teachers in training at the two normal schools of the province, are granted certificates without any definite requirements as to their knowledge of agriculture. Special qualifications in agriculture are given only to those who attend the summer school. At the present time a new and tentative course in nature study, school gardening and elementary science is being tried out in the Normal Schools.

Summer schools for teachers are held each year in the city of Victoria. Rural science and household economics are included in the courses. During 1914 and 1915, 359 teachers took the rural science course. In 1916 the summer school was omitted, but in 1917 it was continued as usual, when 70 teachers took the course in rural science. The course in rural science, preliminary and advanced, includes elementary agriculture, nature study, school gardening and forestry. Class-room and laboratory work is supplemented by field studies and practical work in the school garden. Frequent excursions to farms and parks in the vicinity of Victoria are arranged. A rural science certificate is given to those who complete the first year course, and a diploma to those who complete the second year. These special qualifications entitle teachers to bonuses as teachers of rural science. Free transportation to the summer school is provided.

School Gardens.

The school garden is beginning to play an important part in the teaching of nature study and elementary agriculture. In 1917, 283 school gardens and 211 home plots were conducted. Allowances of instruction funds are made to municipalities to help meet the cost of seeds, fertilizers, labour, summer care, tools, related literature. A sum equal to fifty per cent of the departmental allowances is asked from school boards from their own funds.

NOVA SCOTIA.

For the training of teachers in agriculture in Nova Scotia a rural science school is provided at Truro by the Department of Education. Two sessions are held each year, one during April and May and the other during July and August. The course is given jointly by the staffs of the Normal College and the Agricultural College, both located at Truro.

The teaching of agriculture in the schools is under the supervision of a director of rural science. The work is steadily developing, and in order to better organize and cope with it the director found it necessary to engage two travelling rural science teachers in 1917. This move was attended by such good results that he contemplates increasing his staff of assistants to five in 1918.

The following data for 1917 illustrate the extent of the development of the work in the schools and the enthusiasm shown by the teachers and pupils:

Schools doing special work in elementary agriculture	200
Home gardens	4,176
School gardens	200
Local school fairs (single schools)	70
Schools exhibiting at county fairs	60
Schools exhibiting at provincial exhibition, Halifax	55
Schools exhibiting garden produce	160

This spring a number of small teachers' institutes were held in different parts of the province, to talk up rural science work and give practical hints upon carrying on the work in the schools. Home gardening is stressed much more than school gardening in Nova Scotia.

NEW BRUNSWICK.

In New Brunswick, the elementary agricultural educational work, in all its phases, including the rural science and short course schools and the teaching of agriculture in the schools, comes under the Department of Agriculture.

The teaching of agriculture in the schools is optional, but to assist in and encourage the development of this side of the work, bonuses are given to teachers in accordance with their qualifications, the time devoted to the work during the year and the efficiency of the work done. School districts also receive bonuses, if they qualify for them. The bonuses to both teachers and schools naturally vary quite widely. For the last full year for which data are available—that ending at mid-summer, 1917—the bonuses to teachers totalled about $2,700, and those to schools a little over $1,800.

Rural Science and Short Course Schools.

Two sessions of the Rural Science School were held, simultaneously, at Sussex and Woodstock in 1917. Classes opened July 10 and closed on August 10. At Sussex, there was a class of 53, and at Woodstock 44.

In January, 1918, a short course of a week's duration was held at Woodstock and the attendance was limited almost entirely to those with no previous training along the lines taken up. The purpose of the course was to fit teachers, as much as the limited time would permit of, for taking up rural science and elementary agricultural work in their schools. The attendance, which was 85, taxed the capacity of the class-rooms.

School and Home Garden Work.

This work has been pushed as much as possible from year to year. In 1917 there were about 100 school gardens and 1,700 home gardens, as compared with 19 and 59, respectively, in 1914. In New Brunswick the tendency is in the direction of stressing school rather than home garden work, although much encouragement is given to both.

PRINCE EDWARD ISLAND.

Training of Teachers.

From 1913 to 1916 summer schools for teachers were held at the Prince of Wales College; but there was gradually substituted for these the teaching of rural science

to first and second year students and normal class, during the regular session of the college.

Work in the Schools.

The teaching of rural science, including elementary agriculture, is compulsory, and the aim has been to have all the inspectors and teachers train for and take an interest in the work. The eight inspectors of the province all really act as assistants to the director in the work and the salaries of four of them are paid out of the Agricultural Instruction Act Grant. Bonuses are given teachers in accordance with their training and the extent and efficiency of the work done.

The tendency in the school work of the province is decidedly in the direction of home garden and other home project work.

A household science department was established at Charlottetown in 1917. It is in operation practically throughout the year, and will accommodate twenty-four pupils at a time.

VI. JUNIOR EXTENSION WORK.

SCHOOL FAIRS—BOYS' AND GIRLS' CLUBS.

ONTARIO.

The school fair movement in Ontario has grown year by year, until in 1917 there are no less than 302 school fairs held in the province.

Seeds and eggs are distributed to the pupils. During the past few years, eggs of a bred-to-lay strain of utility breeds of fowls—Barred Plymouth Rock, Rhode Island Red and White Wyandotte, have been distributed pretty well over the province through the medium of the Agricultural Representatives in the school movement. In addition to the great interest aroused among the pupils, and parents also, in poultry rearing on the farms, the bred-to-lay chickens should have a great influence on the poultry industry of the province. Originally the eggs were obtained through the poultry department of the Ontario Agricultural College. Recently the agricultural representatives have established poultry breeding stations in their respective counties, and practically all the eggs distributed in 1917 were from this source.

The Education Department also undertakes to supply eggs for home project work to schools other than rural where classes in agriculture are maintained. These are procured from the Agricultural College. Under both systems of distribution a nominal charge is made for the eggs.

The following table gives a summarized and comparative statement of the number of fairs, number of children competing, and the number of entries made, with attendance, during the past three years:—

	1915.	1916.	1917.
Number of fairs held..	234	275	302
Number of schools included..	2,291	2,620	2,825
Number of children taking part.	48,386	60,262	68,862
Attendance of children at fairs..	72,860	83,029	86,121
Atendance of adults at fairs..	84,406	95,217	82,077
Total attendance.	157,266	178,246	168,198
Number of entries..	116,236	113,263	106,570
Number of home plots..	51,243	55,947	59,329

In spite of unfavourable conditions in many districts, the fairs were an improvement over last year, not so much in the number, as in the quality of the exhibits. Pupils are taking greater pains in the preparation of their exhibits for the fair, and where size and quantity seemed to be the rule a few years ago, quality is now the outstanding feature.

In addition to assistance from the Federal grant, practically every organization connected with the rural communities stood behind the school fair and rendered valuable assistance, not only financially, but in the conduct of the various special features. The boards of agriculture donated silver cups or shields; the women's institutes assisted in conducting refreshment booths in aid of the Red Cross, and undertook in some cases to supply judges for the girls' work in baking and sewing; the Junior Farmers' Improvement Association had complete charge of some of the live stock competitions conducted at the fair, and the trustee boards and the township councils were generous in making grants to enable the rural school fair associations to pay for prizes.

The Rural School-Fair Association.

Special mention should be made of the Rural School Fair Association itself, which is composed of representative pupils from each school in the district, who were elected by ballot by their own school. The accredited delegates from each school meet, form a rural school-fair association, and elect officers. The school-fair officers meet perhaps twice during the season to discuss matters pertaining to the welfare of the fair. Special duties were assigned each officer and director and their assitance was of untold value. The splendid business training these boys and girls thus received will no doubt stand them in good stead in future years.

Special Features.

The special features worthy of more than a passing note are the live stock judging competitions for teams of three boys from each school, who are asked to judge two classes of live stock, generally beef or dairy cattle and heavy horses; the public speaking contests in which from two to ten boys and girls compete; the boys' and girls' driving contest, which includes hitching and unhitching; the school fair parades; physical drill under the Strathcona Trust; weed and apple naming contests, and the exhibition of calves and colts led by the boys who spent considerable time training their pet animals.

Special mention should be made of the "Childen's Tag Day" at the school fair, when patriotic buttons were sold by three girls from each school. The response in most districts was generous. Last year $5,518.14 was collected from the sale of these buttons, and, after deducting expenses, a motor carryall costing $2,000 was purchased and donated to the Military Hospitals Commission, to be used specially to convey wounded soldiers from the hospitals to the Vocational Training classes at the University. The inscription on the plate of the carryall bears these works: "*The children of the rural school fairs in Ontario, Canada, organized by the Ontario Department of Agriculture, donated this car with proceeds secured from the sale of patriotic buttons at the rural school fairs, held in the province, 1916.*" The balance of the proceeds was handed to the Soldiers' Aid Commission, to be used to relieve special cases of distress of returned men.

QUEBEC.

Forty-one school fairs were held during the year 1917 in the French-speaking counties of the province of Quebec. Products were exhibited by nearly 115,000 children. Both children and parents displayed marked interest, and those in charge of the movement are of opinion that the fairs constitute an important factor in the agricultural progress of the province.

In September, 1917, twenty-one Protestant school fairs, in which Macdonald College co-operated, were successfully carried through as a result of a year's careful planning on the part of the organizers and of the children. This was an increase of eight over the previous year, and with scarcely an exception each fair was larger. Settings of eggs and seeds were distributed among 4,893 school children.

The School of Household Science at Macdonald College interested itself in the sewing, canning and cooking exhibits with excellent results. As a consequence of the canning instruction, hundreds of homes were supplied with fruit and vegetables for the winter months. Many of these homes were formerly strangers to such foods.

For school fair work, the college offers eggs from one breed of fowls, and vegetables seeds from certain approved strains. The college is managing, through the school children, to interest the farmers in establishing a root seed industry. This is very important, as ninety per cent of our mangel seed formerly came from Germany. The college also offers potatoes and two or three kinds of corn of varieties that have been approved. For example, the Quebec yellow corn, which ripens in the province of Quebec, is one of the earliest corns produced. The college has improved it in quality and size and has distributed it to the children, after refusing it to dealers at $100 per bushel. The college has distributed several varieties by this means. This has attracted the attention of parents, and little difficulty is found in getting prizes for school children.

MANITOBA.

Probably no phase of agricultural extension work has developed so rapidly in Manitoba as the boys' and girls' clubs, and it is now evident that expenditure of both money and energy in this work is accomplishing gratifying results.

The membership, 15,000 in 1917, is now 25,000. Four years ago it was 750. The total school population in Manitoba is 103,000, and when we deduct 40,000 the number in attendance at Winnipeg and Brandon schools, and probably another 15,000 who are under ten years of age and consequently too young for boys' and girls' club work, it will be seen that the 25,000 enrolled in boys' and girls' club work, includes almost all the children of the province who would naturally be expected to take an interest in the subject.

Hitherto work has been carried on in connection with the public schools, and its success is largely due to the unselfish support of the teachers of the province. This year, every high and consolidated school took part. In this work the Department of Agriculture, and the Department of Education co-operate and as a consequence there is no duplication of effort and the best support of all branches of both departments is freely given at all times. An effort is made to correlate the educational and economic phases, so that those engaged in the contests may receive instruction in agriculture and home economics.

In organizing clubs the plan followed is to co-operate with teachers, public school inspectors and prominent business men and farmers. A central club is usually organized at the natural marketing centre of the district. Its officers consist of an organizer, or general manager, president or secretary. The duty of the central club is to organize and direct the activities of the branch clubs established at each of the rural schools within a radius of from four to twelve miles. The president and secretary of both the central and branch clubs are usually selected from the older members of the club. While the school is the centre, the membership is not confined to the pupils. The older boys and girls of the district are eligible to membership, the age limit being from seven to eighteen.

The contests and fairs in connection with boys' and girls' clubs are concerned with agriculture and homemaking, and members may enter at the age of ten. Of course the educational value of a club contest in the case of a child of ten is to be found chiefly in the play element. But the boys' and girls' club movement promises to exercise a strong influence upon the school and home activities of young people. The inspectors here recognize the danger of too early specialization and over-absorption in one branch of study to the detriment of the rest, and they desire to limit strictly the number of contests which children, particularly young children, should be permitted to enter. Moreover, while recognizing to the full the value of the boys' and girls'

clubs and the great practical results of the movement, they express the belief that the educational possibilities of the work are not limited to individualistic and vocational elements alone. During the elementary school age, especially, the general educational bearings of this form of instruction in agriculture and homemaking should be regarded as of chief importance, and in the later years of school life the socializing and liberalizing value of agriculture should not be over-shadowed by the vocational. The experience with book courses in elementary agriculture is not any more encouraging here than elsewhere. As the local or branch clubs are formed, with the school as centre and the teacher as guide, philosopher, and friend, an effective combination is brought about. Nature study, elementary science, agriculture, can be directed and studied in the school garden and the school library. The agricultural laboratory of the country school is in the school and home garden, and the motive of the practical work is in the contests of the boys' and girls' clubs.

The activities of the clubs were carried on along twelve lines of contests; the approximate enrolment in the main contests being as follows:—

One-half acre of pure seed growing	900
Gardening and canning	5,000
Poultry rearing	2,500
Garment making	3,000
Cookery	3,000
Pig, calf or colt rearing	2,000

The juniors, for the most part, engage in poultry keeping and gardening while the older pupils find most interest in the pig and calf rearing contests and in growing registered seed. This year, several of the larger clubs had over fifty members rearing pigs and forty rearing calves. Besides the above there is a large enrolment in manual training, noxious weeds contest, and essay writing contest.

The junior seed growers received sufficient wheat, oats, barley, corn or fall rye for a half acre plot. It was stipulated that the work be done entirely by the boy. These plots were inspected by competent men and the boy instructed in the principles of selection. From this half-acre plot the boy or girl selects sufficient heads of the most desirable type for his quarter-acre plot next year. Besides the prizes given at the local Boys' and Girls' Club Fair, $150 in prizes were awarded at the Provincial Seed Fair. The exhibit consisted of a half bushel of grain and a sheaf.

How the competitions are operated.

In the gardening contest, potatoes, peas, and beans are the main crop. Improvement in form and quality and yield is aimed at. Altogether 725 bushels of potatoes and 10,325 pounds of peas and beans were distributed. Canning demonstrations were given at most of the centres, practically all of the surplus vegetables were canned.

A local bank has given able support to the movement, and it is largely due to this interest that so many pigs were in evidence at many of the fairs. The managers frequently lend money to the boys and girls to buy pigs, taking as collateral only the boys' and girls' own note. Last year every note was promptly redeemed on maturity. The boy or girl purchases a pair of young pigs in the spring, has their weights certified by an officer of the club, and then feeds them through the summer, keeping an accurate record of the kinds and amount of feed used. On the day of the fair the pigs are again weighed and their records handed to the director of the contest as a guide to the judge in making the awards. The pigs are often sold on the day of the fair, and they readily command the highest market price. The profit is the boys. It is no longer "Johnny's pig and Daddie's pork."

Poultry rearing is a valuable contest, and is resulting in much improvement among the poultry flocks throughout the province, as well as furnishing valuable training to the members. Anywhere from fifteen to seventy-five exhibit coops of poultry may be seen at the local fairs.

Short courses in manual training.

In connection with the manual training work twenty short courses were held during the summer, each of two weeks' duration. These were conducted by the regular manual training teachers of the province. Such lumber as could be obtained locally (even packing boxes were sometimes commandeered) and improvised benches were used. The only tools used were those that they could obtain at home. Each boy and girl made from three to six useful articles which would have done credit to a boy working in a fully equipped manual training room. Nor is the girls' work forgotten. Twenty short courses extending over two weeks each were conducted in cookery and sewing. The exhibits in cooking and sewing at the fairs attracted much comment both for their number and excellence. A notable feature of the fairs is the number of prizes won by the girls for poultry, calf and pig rearing. About 160 fairs were held, the Extension Service furnishing judges.

Bulletins circulated.

The following valuable bulletins were prepared and published this spring for the use of club members in their respective contests:—

Seed Growing.—Professor T. J. Harrison.

Pig Raising.—Professor F. Jacobs.

The Home Garden.—W. T. G. Weiner, B.S.A., and J. A. Neilson, B.S.A.

Garment Making.—Miss Blackburn

Canning by Cold Pack Method.—Prof. C. H. Lee and Miss R. M. Atkinson.

Five thousand club handbooks were distributed during the year, at a cost of fifteen cents per copy.

Last year the boys' and girls' clubs were represented by fifty-one entries at the Manitoba Soil Products Exhibition. The quality of the grain shown indicates that before long they will be formidable competitors for the chief prizes.

SASKATCHEWAN.

In Saskatchewan, school fairs are under the direction of the Department of Education. For the purposes of administration, the province is divided into two parts, north and south, with a director of school agriculture in charge of each. The members of the Rural Education Associations co-operate, as do the agricultural representatives and the staff of the College of Agriculture. Of other agencies, the agricultural societies have given the greatest assistance, sometimes by organizing the school fair, again by support and financial backing, making the work of fair committees less difficult, and very frequently by enlarging their own prize lists so as to include school work. The grain growers', homemakers' and women's grain growers' clubs and individuals interested in boys' and girls' work aid the movement.

The school fair is looked upon as an exhibition of the whole work of the school, and its programme has steadily developed toward that end. Prominence is being given to singing, original story telling, sports and games, so that while agriculture, gardening, household science and handwork hold the larger place and will doubtless continue to do so, the tendency is to develop a programme that will give the public a true idea of the whole range of school activities.

No financial aid in the way of grants is given, and the movement is chiefly dependent for its success and support upon local initiative and enthusiasm. By making the fairs dependent on the interest and support of the local community, it is the expectation that they will continue as a permanent and valuable feature of the educational system. Some 35,000 children and a like number of adults took part in the 150 school fairs held in the province in 1917.

Boys' and girls' clubs.

In 1917, sixty boys' and girls' clubs were in operation in the province, and it is the desire of the Department of Agriculture to extend this movement and to make it a greater educational force. Mr. T. G. Rayner, B.S.A., formerly agricultural representative at North Battleford, was appointed, early in 1918, as assistant director of extension at the College of Agriculture. It is intended that he shall devote his attention to this phase of the work with a view to reaching every boy and girl who is not linked up with some organization whose object is to supplement the work of education.

ALBERTA.

The work in connection with the school fairs in the province of Alberta followed much the same lines as in previous years, but it has expanded considerably both with respect to the number of fairs held and with respect to the work carried on. During 1916 the number of schools organized for school fair work was only eighty-five; during 1917 one hundred and sixty-six schools were included, an increase of over 80 per cent. In addition to there being a larger number of schools, there was also a decided improvement in interest on the part of the public, and the attendance was very large, in some cases reaching up to about two thousand people, and in the majority of cases running from four to eight hundred. The quality of interest, likewise, was much greater than in the case of the ordinary mixed district fair. The limitation in the classifications and the fact that the work was done by children both led to a concentration of attention on the kind of work that is being done.

The standard classes of competitions among the pupils of each school included potatoes, carrots, beets, parsnips, turnips, mangolds, peas, bouquets of cut flowers and chickens. There was an improvement shown in such matters as grading of potatoes, and in the smoothness and quality of all classes of garden products. The household science work included sewing and embroidery and darning; the making of tea biscuits and cakes; the canning of vegetables and fruits, and the preparation of school lunches. In grains, prizes were offered for sheaves of wheat, oats and barley. The live stock classes were represented by pail-fed dairy heifers; pail-fed beef heifers and steers, and halter-broken and groomed foals. In addition to this, in all the fairs there were numerous miscellaneous classes differing in different districts according to the tastes of donors and directors of the fairs. They included such matters as collections of weeds, collections of insects, collections of sewing, pure-bred calves, mixed stock exhibits by school pupils. The exhibits in all cases were superior to the exhibits of the same kind ordinarily brought out by adults.

At the Olds Fair there was a fine exhibit of hogs, which was provided for by the co-operation of the district agent with the manager of the Bank of Commerce. The pig-growing contests is really a minature farm enterprise, which includes financing, feeding, breeding and selling. Each boy or girl wishing to enter the competition borrows sufficient money from the bank to buy two pigs. He feeds the pigs during the summer and sells one of them to retire the note, which bears 6 per cent. The bank also gives prizes amounting to 6 per cent at the fall fair. The other pig is kept for breeding purposes, and the success or failure of this work will have to be told the following year. All the animals shown give evidence of good care and attention and while the original pair only cost thirty-two dollars, some of the single pigs sold as high as forty-five dollars on the day of the fair.

In addition to the school fairs held directly under the supervision of the agricultural representatives there were a number of small fairs held in the province under purely local patronage, and many of these possessed an interest quite equal to those held under official direction. Altogether twenty-one fairs were held in 1917. In 1918, Mr. E. S. Hopkins will take charge of the school fairs and will secure the co-operation of inspectors and teachers.

Pig club work is under the direction of the principal of the Olds School of Agriculture. The plan followed is for the department organizer to purchase the stock, distribute it, give instruction in the care of it, arrange the fair prize list and supply judges. The local banks finance the young people, and contribute to the prize list.

BRITISH COLUMBIA.

School Fairs.

Up to the present there has been no general movement for the establishment of school fairs. Where the produce of school and home gardens has been exhibited, it has usually been in connection with the regular fall fair. At Chilliwack the movement began in 1915 with a display of school and home garden produce at the regular exhibition, and in 1917 developed into a school fair for the reason that the regular fair was not held that year. School fairs and school exhibits at regular fairs numbered 15 in 1917.

Boys' and Girls' Clubs.

Boys' and girls' clubs work in British Columbia has consisted hitherto of competitions for boys and girls conducted by the Department of Agriculture through the medium of the farmers' institutes. These competitions are not connected with the teaching of agriculture through the schools or with the school fairs, but the exhibits are sent to the provincial seed fair either at Armstrong or at New Westminster.

In 1914, the British Columbia department organized and conducted boys' and girls' potato-growing competitions. The results were so gratifying that they were continued in 1915, 1916 and 1917.

In 1917 five competitions as follows were organized, open to the members of boys' and girls' clubs organized within the province:—

1. Potato-growing.
2. Corn-growing.
3. Pig-rearing.
4. Poultry-rearing.
5. Calf-rearing.

Cash prizes were offered in each class. Provincial sweepstakes were also established for those securing the highest number of points in the different competitions. The winners were given a choice of prizes (1) a pure-bred pig, (2) a pen of pure chickens, and (3) a set of agricultural reference books.

The boys' and girls' club organizing and conducting the most successful competition or competitions, judged according to the total number of competitors, financial report and an essay, received from the Department of Agriculture a library composed of eight of the best agricultural periodicals published, to be circulated among members of the club.

NOVA SCOTIA.

The school fairs showed a marked improvement last year in Nova Scotia. Not only did the number increase, but the quality of the exhibits surpassed that of previous years.

In 1917, 55 schools sent rural science exhibits to the Provincial Exhibition, 60 to the County Exhibition, and 70 exhibited locally. Deducting those who exhibited at more than one place, 160 different schools exhibited their produce. This is about 6 per cent of the schools in the province.

NEW BRUNSWICK.

There were 14 school fairs held during 1917. The number of schools represented at the different fairs varied from 1 to 5, the total being 23.

The two main features of the home project work of 1917 were a Poultry and a Potato Growing Competition.

PRINCE EDWARD ISLAND.

School-fair work is developing quite rapidly. In 1916 four fairs were held. In 1917 there were 14 fairs held, and at these 83 schools were represented, or practically 6 schools to a fair. In the school fair work the aim has been to make it as highly educational as possible, and with this end in view the boys and girls undertake much of the executive work.

Boys' and girls' club work in Prince Edward Island has been placed in the hands of the Rural Science Department. It is just in its infancy. The only organization of this nature in 1917 was the "Prince of Wales College Boys' Potato-Growing Contest." In all, 35 boys entered the contest, and in the fall a school fair, featuring the contest, was held at the college.

Plans were made during the winter for the organization of boys' and girls' poultry and pig clubs and these are receiving the hearty support of the egg and poultry and live stock associations. Eggs are supplied the poultry clubs from inspected flocks.

Clubs may be organized only at school fair centres. Fifteen poultry clubs and several pig clubs have been formed.

VII. AGRICULTURAL SCHOOLS.

VOCATIONAL SCHOOLS OF AGRICULTURE.

A recognition of the need for facilities for training farm boys and girls for the pursuit of agriculture and for rural life is responsible for the establishment of vocational schools of agriculture with the assistance of the Federal grant. To qualify for farm life is the leading object of such institutions, and in each of these schools the study of agriculture is the leading feature of the course of instruction. In order to be successful, schools of this character aim to develop a purely agricultural atmosphere. To accomplish this, not only must the teacher be in active sympathy with the purpose of the schools, but the subjects taught should be of direct utility in equipping the student for the vocation of farming. The schools of agriculture will lead directly to the farm in the case of a majority of the students. At the same time, they will prepare those who aspire to it for a college course in agriculture leading to a degree, thus tending to relieve the agricultural college of the necessity for providing instruction of an elementary nature, such as the student should have acquired before entering its portals.

THE ALBERTA SCHOOLS OF AGRICULTURE.

Alberta was the first province in the Dominion to institute agricultural schools, designed to meet the needs of young men and women from the farm by equipping them for farm life.

In 1913, three schools of agriculture were established by the Department of Agriculture, one at Claresholm, one at Olds, and one at Vermilion.

Each school is located on one of the provincial government's demonstration farms. The farms are half sections of 320 acres, and part of the land is set apart for the use of the schools of agriculture.

These schools are essentially schools for the training of farmers' sons and farmers' daughters. There is no entrance examination and no fee, and they offer to a great many young people of the province the only opportunity open to them for improving their education.

The fact that these schools are distributed over the province one being in the south, one towards the central portion of Alberta and the other one east of Edmonton has made them accessible to a greater number of students than would be a centrally located agricultural college.

The two year course of instruction is similar to that given during the first two years at an agricultural college, and in order to enter the Alberta Agricultural College it is necessary that the student shall have taken the course at a school of agriculture,

The reasons for the establishment of these schools were explained somewhat fully at the time by the Alberta Minister of Agriculture, the Hon. Duncan Marshall. Mr. Marshall pointed out that the only education the ordinary farm boy gets is what he secured at the rural public school and that in many cases the training was indifferent both as to quality and quantity. After the boy had ceased attending school for some time, he awakened to the fact that he was very poorly equipped for his life work. Not having a sufficient knowledge of agriculture to make farming attractive to him, he too often left for the city in the hope that he might find something there that would give him an easier living.

To the boy on the land the agricultural college is usually a non-attainable thing. It appeals to the few who wish to qualify for agricultural teaching or leadership, rather than to the many who are looking to farming as a means to a livelihood. The purpose of the Schools of Agriculture is to bring right to the doors of the farm boys and girls an opportunity to study the business that offers them the best opportunities, namely, farming.

The aim of the teaching is to make the work relate to the actual work of the farm. Special emphasis is therefore laid on live stock, grain, dairying, poultry-keeping, veterinary science, and farm mechanics. This is supplemented by instruction in English mathematics, farm book-keeping, farm management and the sciences in order that the general educational equipment of the student may be improved.

In the household science department of the schools, young women are instructed especially in home economics. The first session of the two year course is devoted to home problems, and the second year's instruction is designed for those who are preparing to teach household science. The popularity that the schools have enjoyed appears to indicate that they are meeting a very real demand so far as Alberta is concerned. As time goes on and the number of schools increases, it is probable that they will exercise a marked influence, not only on the development of agriculture, but also on the citizenship of the province.

During the summer months the members of the staffs, whenever available, are used in extension work among the farmers. They give attention to the cow-testing competitions conducted annually by the department, judge at fairs, address farmers' gatherings, assist with school gardens and school fair work, as well as in various other capacities.

The province avails itself of the financial assistance rendered by the Agricultural Instruction Act to provide from this source the greater portion of the funds needed to equip and maintain these schools, but, with minor exceptions, the cost of the buildings themselves was provided by the province.

The schools maintained their attendance during the year in spite of the scarcity of labour and the large number of enlistments among the boys of the farm. A conference was held at the close of the schools in the spring of 1918 in which the courses were reviewed and a number of changes instituted. The subjects added were civics and rural economics for boys and rural organizations for girls.

Course for Returned Soldiers.

At the Olds school a ten months' special course was offered in 1917 to veterans with the idea of assisting them to qualify for settlement and to engage successfully in agricultural pursuits.

THE NEW BRUNSWICK AGRICULTURAL SCHOOLS.

When aid was first extended by the Federal Government for the advancement of agricultural instruction, the nearest institution at which students from the Maritime Provinces could secure a course of training in agriculture was the Nova Scotia Agricultural College, Truro. It was felt that, so far as a college course was concerned, this institution might very well be made to meet the needs of the three provinces in question by strengthening its teaching staff and by providing certain buildings and equipment of which the institution stood greatly in need. It was proposed in addition that New Brunswick and Prince Edward Island should erect and conduct agricultural schools, where less advanced courses in agriculture could be provided, leading either to the farm or to the agricultural college.

In New Brunswick three such schools were contemplated, one at Woodstock, another at Sussex and a third in the northern section of the province. Two of these have since been built. The Fisher Vocational School at Woodstock was presented to the province in 1914 by the Fisher estate, on the understanding that the province should equip and maintain the institution and make provision for an agricultural department. Instruction Act moneys were allotted for this purpose. A second school was provided at Sussex and opened in 1915, the cost being met by the Federal grant. It has not been found practicable, owing to the war, to conduct regular courses of instruction at either of these schools. The buildings are being utilized at present for holding of short courses for farmers and farmers' sons, for household science courses, and for courses for teachers in nature study and agriculture. In addition, the buildings are being used to provide office accommodation for members of the provincial staff whose work in connection with agriculture and education is most conveniently conducted from these two centres.

THE SCHOOL AT KEMPTVILLE, ONTARIO.

A year ago the Ontario Department of Agriculture decided to erect a school for the benefit of the Eastern Ontario counties. It was felt that the work should not be completed until the conclusion of the war. During the year, however, several steps of importance have been taken with a view to getting the work properly established. A principal was appointed to supervise the work and conduct short courses and such other educational work as might be found practicable. Improvements were made in the farm stock and also in the farm buildings, and a contract was let for the erection of a building to be used as a live stock judging pavilion. This it is expected will be completed in 1918, but will be the only important building undertaken during the war. It is felt that it will serve a useful purpose in providing accommodation for the short courses and other educational work which it may be necessary to carry on pending the completion of the larger plan.

VIII. SHORT COURSES.

LOCAL SHORT COURSES IN AGRICULTURE AND HOUSEHOLD SCIENCE.

ONTARIO.

The short course, now a prominent part of the work assisted by the Agricultural Instruction grant in nearly every province, aims to supply technical information, in condensed form, to those who desire to better equip themselves for some particular line of farm work.

In Ontario, where practically every county in the province now has its resident representative, classes for young farmers have been carried on by these men for a number of years. Where apathy existed, the agricultural representative by personal solicitation induced young men to attend, and a work of great value to the agricultural community has been accomplished. Courses in household science for young farm women are now carried on concurrently with the men's courses. The object of the Ontario courses is not primarily to teach the boys how to farm. The aim is rather to make a study of the principles upon which common every day farm operations are based; to create a greater interest in farm life; to induce the young man to inquire more closely into things; to make him acquainted with new and approved ideas and to instruct him where to seek for the latest information and assistance science can give him in his farm operations.

Lectures are given by the agricultural representatives which are supplemented with practical work in the class room such as testing milk, judging grains and clover seeds, identification of seeds of noxious weeds, pruning and grafting, making of Bordeaux mixture and the visiting of stock farms for practice in judging live stock.

The following is a summarized statement of the Ontario courses in agriculture for the past few years:—

Year.	No. of Courses.	Attendance.
1912	19	377
1913	16	346
1914	28	555
1915	43	1,114
1916	36	888
1917	36	839

In other provinces, where agricultural representatives are not so well established, the usual practice is for a staff of instructors to hold courses according to schedule at various local points. In some instances a number of subjects are featured, such as the operation of gas engines, farm book-keeping, poultry-keeping, etc. Special courses varying in length from one to four weeks are commonly held by the colleges and schools of agriculture at seasons when regular course students are not in attendance.

Related forms of work are the demonstration trains, seed fairs and poultry shows where arrangements are made for specialists to attend and give lectures and demonstrations.

Stock Judging Classes.

In an endeavour to give practical instruction in live stock improvement work, the Ontario Department of Agriculture some ten years ago, organized practical judging courses for farmers and their sons. After a brief talk on such line of the live stock industry as the delegate thinks of greatest value to those in attendance, three or four specimens of the class of stock to be discussed are brought into the ring. After pointing out and discussing the desirable and undesirable characteristics, those in attendance are asked to judge the animals and give systematic reasons to support their opinions. The instructor then gives his placings and illustrates his reasons.

For a number of years the majority in attendance, including not a few of the experienced stockmen, were reluctant in giving their opinions. The perfect freedom of discussion during recent seasons induces all to present their opinions and problems. Keen and profitable discussion now follows the placing of each class and the experienced as well as the amateur breeder receives valuable instruction.

Some forty-five of these two-day courses with from two to four classes of stock were held during the winter of 1917-18 with an average attendance of 175. This is a considerable reduction as compared with the previous year, due largely to labour shortage and unfavourable weather conditions.

Judges' Courses.

Short courses for training Fall Fair judges and for judges of field crop competitions are provided at the Ontario Agricultural College, Guelph, and at the Central Experimental Farm, Ottawa. Instruction is given in the judging of heavy and light horses, beef and dairy cattle, sheep, swine, poultry, and field crops. By this means men trained to a uniform standard of judging are provided for the 214 fairs held by agricultural societies, and for the 177 societies holding field crop competitions. In 1917, the competitions comprised 3,500 fields of wheat, oats, barley, corn, potatoes, clover, turnips, mangels, beans, and peas. At Guelph, 200 judges were present and at Ottawa 125 took the work.

At Kemptville Agricultural School.

A four-day course in general agriculture was presented at the Kemptville Agricultural School in January, 1918. Dominion and provincial instructors took charge of the classes. This course marked the inauguration of the school as a teaching institution, and was held concurrently with the annual fair for the Eastern Ontario Seed Growers' Association.

QUEBEC.

Winter short courses or demonstration lectures for the French-speaking population of the province of Quebec are held in two series, one covering the northern and the other the southern district. The subjects include every branch of farming, together with poultry and bee-keeping, home and market gardening, various household science subjects, hygiene, and the control of injurious insects and plant diseases. In the north, the work is conducted by the Professors of the School of Agriculture at St. Anne de la Pocatière. In the south, the classes are conducted jointly by officers of the Department of Agriculture and professors from the School of Agriculture. The duration of each course is about one week, lectures being given each morning and afternoon. In the evening, the subjects taken up during the day are usually illustrated by lantern lectures. Many of the lectures were supplemented by demonstrations. This year the northern series covered seven localities and the southern section, eleven localities. In certain districts the severe weather interfered with the attendance at the regular courses, and in a number of parishes supplementary lectures were given from January to April.

The number of agricultural lectures and demonstrations and the aggregate attendance in both sections was as follows:—

	Lectures.	Demonstrations.	Attendance.
Regular courses.	425	32	40,095
Supplementary lectures.	120	22	6,860
	545	54	46,955

In addition to the above certain members of the Staff of the Oka Agricultural Institute gave a number of lectures in various localities during the winter vacation.

Domestic Science Lectures.

Two domestic science instructors accompanied the southern delegation in its short course tour, giving 89 lectures and demonstrations. The aggregate attendance at the series being 6,315.

During the summer of 1917, a similar series of domestic science lectures was held under the auspices of the young farm women's clubs. Twenty localities were visited, and 310 lecture demonstrations given. The aggregate attendance at these meetings was 21,755.

MANITOBA.

Short courses for farmers extending over a period of two weeks are held at local centers by the extension service. In 1917, they were conducted at twenty-one points, being arranged in four circuits with a staff of instructors provided for each consisting of two for gas engines, two for agriculture, and two for home economics. On account of the shortage of farm help, the gas engine course was specially featured, and probably eight per cent of those taking the course were women.

Dairying and Home Economics.

Through the co-operation of the Dairy and Apiary Branches, four day short courses were held at 12 places where dairying is the leading industry. Owing to the fact that the country is not as thickly settled as the districts in which the other courses were held the attendance was not as large. Nevertheless the interest was very keen, and the attendance uniformly regular. In women's work home nursing was very popular, and cookery was the second choice.

For the most part the instruction was confined to live stock breeding and care, particular attention being paid to the dairy herd. The care of milk and cream, and bee-keeping were equally popular among the students. At these courses a particularly wide use was made of charts and lantern slides.

Home Economics Short Course.

In addition to the short courses held in connection with the men's courses a large number of special five-day courses were held in dressmaking, millinery, cookery, home nursing and canning. The number of courses, average attendance and aggregate attendance was as follows:—

	Number of Courses.	Average Attendance.	Aggregate Attendance.
Dressmaking	65	22	11,890
Millinery	55	24	10,950
Home nursing	25	18	3,320
Cookery	..	38	8,756
Canning	..	52	2,895
			37,811

Manual Training Short Courses.

During July the services of eight manual training teachers from the Winnipeg and Brandon Manual Training schools were obtained, and twelve short courses extending over a period of two weeks were held in connection with the boys' and girls' clubs. Binder crates were used to make benches and the boys brought with them such tools as they were able to find on the home farm. The material used was to quite an extent of the same character. The articles made were chicken brooders, feed hoppers, exhibit coops, wagon boxes, hog self-feeders, etc. By using this kind of equipment the boys

were learning to use the kind of tools, benches, etc., that would be available after the course was over. The aggregate attendance at these courses was over 5,000.

Recapitulation.

	Aggregate Attendance.
Short course schools	29,963
Dairy courses	3,152
Home economics courses	37,811
Woodworking courses	5,000
Grand aggregate	75,926

SASKATCHEWAN.

Short courses in Saskatchewan are conducted by the Extension Department of the College of Agriculture, of which Mr. S. E. Greenway is director. Lecturers this year report the most enthusiastic meetings yet held in the province. Of the sixty odd courses held, not more than three or four were found wanting in the matter of interest.

This year poultry work and farm accounting were included in addition to the usual field and animal husbandry work. The demand for greater production and conservation developed more or less technical work regarding rationing, both for man and beast, which was received with surprising avidity. This is especially true in its relationship to the feeding of farm stock, since feeds are so scarce and so costly, and the need of pork products so great. The situation has been largely responsible for the interest in simple farm accounts, as the farmers desire to know, with some degree of definiteness, just whether their operations in the production of pork are going to net them a profit or not.

The method of conducting the seed fairs for a number of years has been to give them very practical short course features. Often poultry shows are held, and, as the activity usually extends over two or more days, much time is given up to discussions, demonstrations, and judging competitions in cereals, animals and poultry.

NOVA SCOTIA.

Short courses covering all phases of agricultural instruction are held each year in January at the Agricultural College, Truro. The enrolled attendance was 180 and in addition there were several one or two-day conventions and a very considerable intermittent attendance which would bring the total number who took advantage of the educational work up to about 350.

From the standpoint of the work done, and of the interest taken, the staff are unanimous in considering the 1918 short course to have been the best yet given at the College. Special attention was given to the matter of the using of the best kind of seed, and the improvement of the live stock of the country.

In addition to the above, short courses are held at numerous local centres, including those where agricultural halls have been established.

In May, 1917, a week's short course was conducted at Lawrencetown, Annapolis county, the lines followed being somewhat the same as those in the later course at Truro. This course proved so satisfactory that another was asked for and given in March of this year, at which the attendance was about 100. Similar courses were held during March at Middletown (attendance 100), Annapolis (attendance 75), Bridgetown (attendance 75), and Guysborough (attendance 100).

Food conservation and preservation lectures, with demonstrations in canning, etc., were given during the winter at various points in the province. At the Halifax Exhibition, which extended over a period of two weeks, the superintendent of women's institutes gave canning demonstrations daily.

FINANCIAL STATEMENTS.

1. ALLOCATION OF AGRICULTURAL INSTRUCTION GRANT OF 1917-18, UNDER AGREEMENTS WITH PROVINCES.

ONTARIO.

Grant of 1917-18

AGRICULTURAL COLLEGES AND SCHOOLS.

1. Ontario Agricultural College—		
(*a*) Buildings, equipment and furnishings..	$75,000 00	
(*b*) Salaries and expenses, additions to staff, maintenance..	15,000 00	
		$ 90,000 00
2. Agricultural School: Capital expenditure, including land purchase, buildings and equipment, and the services and expenses pertaining thereto..		50,000 00
INSTRUCTION AND DEMONSTRATION.		
3. District representatives: including clerical and other assistance in connection with the administration.. ..		120,000 00
4. Co-operation and markets: Educational work in connection with the marketing of farm products, including organization of co-operative societies..		4,500 00
5. Demonstration and instruction in vegetable growing.		6,000 00
6. Stock and seed-judging short courses and institute lectures.		2,500 00
7. Women's institute work, including courses in cooking, sewing, etc..		7,500 00
8. Short courses for fall fair, field crop and poultry judges: including travelling and living expenses..		4,703 26
9. O.A.C. short courses for winners of acre profit and live stock competitions, including travelling and living expenses..		3,000 00
10. Lectures on horticulture..		800 00
11. Demonstrations with vegetables and hardy fruit in New Ontario..		1,000 00
12. Vineland Horticultural Experiment Station: Experimental work, canning..		2,500 00
13. Drainage work..		6,500 00
14. Demonstration work on soils..		3,900 00
15. Bee-keeping..		800 00
16. Instruction and special educational work in growing and handling of corn..		2,600 00
ELEMENTARY AGRICULTURAL EDUCATION.		
17. To provide for and to encourage the teaching of agriculture, manual training as applied to work on the farm, and domestic science in high, public, separate and continuation schools and in universities, to be available for grants, services, expenses and equipment, and travelling and living expenses of teachers, inspectors and other in attendance at short courses or other educational gatherings, and to be paid out on the recommendation of the Department of Education.. ..		30,000 00
		$336,303 26

QUEBEC.

Grant of 1917-18.

A. COLLEGES AND SCHOOLS OF AGRICULTURE.

1. Grants and allowances: Macdonald College, Ste. Anne de la Pocatière; School of Agriculture, Oka Institute.. ..	$ 75,000 00
2. School of Veterinary Science, building extension..	5,000 00
B. DEMONSTRATION AND INSTRUCTION.	
3. Breeding: Educational work in horse-breeding, cattle and sheep-raising..	7,000 00
4. Poultry: Instruction and demonstration..	18,000 00

E. DEMONSTRATION AND INSTRUCTION—*Concluded.*

5. Bacon: Instruction	$ 5,000 00
6. Horticultural and entomological work	30,000 00
7. Experimental and demonstration orchards	5,000 00
8. Dairying: Educational work in cheese and butter	25,000 00
9. District representatives	40,000 00
10. Seed selection: Clover plots and demonstrations	9,000 00
11. Bee-keeping: Instruction	7,000 00
12. Drainage: Instruction and demonstration	8,000 00
13. Maple industry: Maintenance of schools and allowances to students	4,000 00
14. Short courses: Lectures	9,113 76
15. Experimental Union: Investigation work, field crops	2,000 00
C. ELEMENTARY AGRICULTURAL EDUCATION.	
16. To promote the teaching of agriculture in academies, rural and normal schools, training of teachers, school gardens	10,000 00
17. To promote the teaching of domestic science in academies and normal schools, grants and special lectures	10,000 00
18. School children's exhibits and competitions	2,000 00
	$271,113 76

MANITOBA.

Grant of 1917-18.

INSTRUCTION AND DEMONSTRATION.

1. Killarney Demonstration Farm (maintenance)	$ 3,000 00
2. Dairy work: Instruction in outlaying districts; grading of products for instructional purposes	8,000 00
3. Poultry work	4,000 00
4. District representatives	15,500 00
5. Boys' and girls' clubs	17,000 00
6. Short courses in agriculture	19,113 11
7. Home Economics: Instruction in domestic science including short courses	18,500 00
8. Soil analysis and survey	1,000 00
9. Bee-keeping	2,000 00
10. Miscellaneous	1,000 00
	$ 89,113 11
Allotment for 1917-18	$ 77,113 11
Unappropriated balance from 1916-17	12,000 00
	$ 89,113 11

SASKATCHEWAN.

Grant of 1917-18.

A. COLLEGE OF AGRICULTURE.

1. Staff: Salaries, research and extension service	$ 22,076 16
2. Women's work: Homemakers' clubs	5,500 00
B. INSTRUCTION AND DEMONSTRATION.	
3. Co-operation and marketing	4,500 00
4. Animal husbandry: including veterinary instruction	4,500 00
5. Dairying	4,800 00
6. Field husbandry and weed control	5,000 00
7. Demonstration trains	3,595 71
8. District representatives	2,500 00
9. Veterinary short courses	500 00
10. Junior Extension work	1,180 45
C. ELEMENTARY AGRICULTURAL EDUCATION.	
11. Agricultural instruction in public, high and normal schools; household science; training of teachers; nature study; school gardens	25,000 00
12. School fairs	2,576 48
	$ 81,728 48

ALBERTA.

Grant of 1917-18.

A. SCHOOLS OF AGRICULTURE.

1. Maintenance, salaries, expenses	$ 35,000 00
2. Equipment	2,000 00

B. INSTRUCTION AND DEMONSTRATION.

1. Demonstration farms: Buildings, purchase of stock	8,000 00
2. Demonstration trains	5,000 00
3. Dairying: Dairy competitions and prizes	1,500 00
4. Publicity: Printing and publication of bulletins	2,400 00
5. Women's work	4,500 00
6. District agents	8,500 00
7. Miscellaneous	65 62
	$ 66,965 62

BRITISH COLUMBIA.

Grant of 1917-18.

A. INSTRUCTION AND DEMONSTRATION.

1. Agricultural and horticultural instructors and district representatives	$ 3,500 00
2. Field crop demonstration stations	8,000 00
3. Horticultural demonstration stations	3,000 00
4. Poultry demonstration stations and egg-laying contests	1,500 00
5. Alfalfa plots	500 00
6. Silo demonstrations	3,000 00
7. Drainage demonstrations	1,000 00
8. Seed distribution and co-operative variety tests, seed production, seed fairs	5,500 00
9. Dairying: Cow-testing associations	3,000 00
10. Bee-keeping	2,500 00
11. Field crop competitions	2,000 00
12. Boys' and girls' clubs	1,000 00
13. Fruit-packing schools and demonstrations	1,000 00
14. Market work	4,500 00
15. Agricultural Journal; Publication Branch	5,000 00

B. INVESTIGATION AND RESEARCH.

16. Pathological and entomological investigation and research	2,000 00
17. Weed investigation and survey	1,500 00

C. ELEMENTARY AGRICULTURAL EDUCATION.

18. Agricultural instruction in public, high and normal schools, household science, training of teachers, grants	20,000 00
19. Contingencies and miscellaneous	699 06
	$ 69,199 06

NOVA SCOTIA.

Grant of 1917-18.

1. Colleges and schools of agriculture: Capital—Science building, construction and furnishings, interest and sinking fund	$ 8,000 00
2. Salaries and maintenance	23,000 00
3. Demonstration and instruction: District representatives	9,500 00
4. Short courses: Demonstration buildings, maintenance, allowance to students	2,400 00
5. Dairying	3,500 00
6. Poultry	1,500 00
7. Bee-keeping: Educational work	600 00
8. Drainage: Demonstration and soil survey	1,500 00
9. Soils and fertilizer demonstration	1,500 00
10. Field crop demonstration	1,500 00
11. Fruit growing	2,000 00
12. Women's work: Institutes and clubs, domestic science, short courses and allowances	3,000 00

NOVA SCOTIA—COLLEGES AND SCHOOLS OF AGRICULTURE—*Concluded.*

13. Entomological work: Horticultural and entomological investigation, and education re insect pests..	$ 10,000 00
14. Elementary agricultural education: Agricultural instruction in public, high and normal schools, training of teachers, allowances and grants..	10,000 00
15. School children's exhibits and competitions..	2,000 00
16. Contingencies and miscellaneous..	1,716 69
Total..	$ 81,716 69

NEW BRUNSWICK.

Grant of 1917-18.

INSTRUCTION AND DEMONSTRATION.

1. District representatives..	$ 13,500 00
2. Bee-keeping..	900 00
3. Soils and drainage..	4,000 00
4. Horticulture..	6,500 00
5. Short courses..	1,300 00
6. Live stock..	7,000 00
7. Dairying..	4,000 00
8. Poultry..	2,100 00
9. Fertilizers..	2,000 00
10. Entomology..	1,300 00
11. Agricultural societies..	4,000 00
12. Women's institutes..	6,000 00

ELEMENTARY AGRICULTURAL EDUCATION.

13. Agricultural instruction in public, high and normal schools, household science, training of teachers, allowances, grants..	9,785 80
14. School fairs..	1,725 00
Total..	$ 64,110 80

PRINCE EDWARD ISLAND.

Grant of 1917-18.

A. BUILDINGS ACCOUNT.

1. Agricultural buildings—equipment and maintenance.. ..	$ 2,950 00

B. INSTRUCTION AND DEMONSTRATION.

2. Director and district representatives..	7,000 00
3. Short courses..	250 00
4. Drainage and soils..	3,600 00
5. Dairying..	2,400 00
6. Bee-keeping and fruit growing..	300 00
7. Women's Institutes, household science, short courses, grants and allowances..	3,500 00

C. ELEMENTARY AGRICULTURAL EDUCATION.

8. Agricultural instruction in public and high schools, training teachers, allowances, grants, manitenance of rural science department, Prince of Wales College..	9,500 00
9. Miscellaneous and contingencies, including clerical assistance..	2,249 22
Total..	$ 31,749 22

2. AGRICULTURAL INSTRUCTION GRANT OF 1917-1918.

Dates of Payments and Amounts Paid to Provinces.

Ontario	May 21, 1917.	$ 168,151 63
	Nov. 16, 1917.	168,151 63
Quebec	June 9, 1917.	135,556 88
	Oct. 30, 1917	135,556 88
Manitoba	May 22, 1917.	10,000 00
	June 23, 1917.	34,556 55
	Jan. 7, 1918.	44,556 56
Saskatchewan	Aug. 17, 1917.	40,864 24
	July 24, 1918.	40,864 24
Alberta	May 25, 1917.	33,482 81
	Dec. 7, 1917.	33,482 81
British Columbia	July 17, 1917.	34,599 53
	Mar. 19, 1918.	29,349 53
Nova Scotia	June 4, 1917.	40,858 34
	Nov. 14, 1917.	40,858 35
New Brunswick	July 19, 1917.	32,055 40
	Dec. 7, 1917.	32,055 40
Prince Edward Island	June 26, 1917.	15,874 61
	Mar. 1, 1918.	15,874 61
Veterinary Colleges—		
Ontario Veterinary College	(No payment).	12,574 85
School of Veterinary Science, Montreal	Nov. 20, 1917.	7,425 15

3. STATEMENTS, BY PROVINCES, OF EXPENDITURE OF AGRICULTURAL INSTRUCTION GRANT FOR THE FISCAL YEAR ENDING MARCH 31, 1918.

PROVINCE OF ONTARIO.

Grant of 1917-18.

SUMMARY STATEMENT, April 1, 1917, to March 31, 1918.

No.	Classification.	Balance April 1.	Grant	Refunds	Total Credits.	Expenditure.	Cr. Balance.
		$ cts	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1(a)	O.A.C. capital expenditure	55,339 72	75,000 00	....	130,339 72	9,466 32	120,873 40
1(b)	O.A.C. salaries and additions to staff	3,355 86	15,000 00	150 00	18,505 86	14,551 92	5,953 94
2	Kemptville Agricultural School	28,581 34	50,000 00	1,584 46	80,165 80	32,472 85	47,702 95
3	District representatives	847 07	120,000 00	726 64	121,573 71	121,528 60	45 11
4	Educational work *re* marketing	2,618 55	4,500 00	325 00	7,443 55	7,058 22	385 33
5	Dem. and Inst. in vegetable growing	94 61	6,000 00	400 00	6,494 61	6,455 65	38 96
6	Stock and seed judging course and institute work	3,140 79	2,500 00	1,395 42	7,036 21	4,573 45	2,462 76
7	Women's Institutes	170 76	7,500 00	1,245 20	8,915 96	7,116 22	1,799 74
8	Short courses fall, fair and field crop judges	367 74	4,703 26	244 00	5,315 00	4,412 58	902 42
9	O.A.C. short courses, etc.	24 48	3,000 00	254 50	3,278 98	2,717 95	561 03
10	Lectures on horticulture	11 02	800 00	2 70	813 72	383 25	430 47
11	Dem. vegetables, hardy fruits, N. Ont	2,361 75	1,000 00	2,575 62	5,937 37	5,570 21	367 16
12	Vineland Horticultural Expt. Station	1,261 23	2,500 00	.. .. ..	3,761 23	2,182 92	1,578 31
13	Drainage work	1,655 61	6,500 00	580 70	8,736 31	4,268 03	4,468 28
14	Demonstration work on soils	514 40	3,900 00	500 00	4,914 40	4,816 86	697 54

PROVINCE OF ONTARIO.

SUMMARY STATEMENT, April 1, 1917, to March 31, 1918—*Concluded.*

No.	Classification.	Balance April 1.	Grant.	Refunds.	Total Credits.	Expenditure.	Cr. Balance.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
15	Bee-keeping	674 07	800 00	200 00	1,674 07	1,057 93	616 14
16	Inst. and special educational work in growing and handling corn	... .	2,600 00	300 00	2,900 00	2,826 94	73 06
17	Elementary agricultural education	22,763 34	30,000 00	351 75	53,115 09	24,116 95	28,998 14
	A. Aid—Live stock in N. Ontario	3,427 84	... ...	.. ...	3,427 84	... .	3,427 84
	1914-15—Dem. in live stock and poultry	901 89			901 89	18 22	883 67
	1915-16—Dairy demonstrations	15 81	.... ..	.. ...	15 81	.....	15 81
	1915-16—Demonstration work *re* spraying and pruning	3,197 42	(Less transfer 2,455 75 to No. 11.)	316 66	1,058 33	958 33	100 00
	A. Aid—Western Ontario creamery work	1,131 90	....	....	1,131 90	....	1,131 90
	" Dairy survey	215 51	....	....	215 51	....	215 51
	" Ont. Vet. College, additional land	13,494 93	....	.. ...	13,494 93	675 00	12,819 93
	1913-14—Miscellaneous	1,869 24	... .	.....	1,869 24	....	1,869 24
	A. Aid—Milking shorthorns	1,856 11	.. ...	.....	1,856 11	.....	1,856 11
		149,886 78	336,303 26	10,952 65	494,893 15	256,618 40	238,274 75
					Less Agricultural Aid balances		19,451 29
							218,623 46

PROVINCE OF QUEBEC.

Balance of Grant of 1916-17.

SUMMARY STATEMENT, April 1, 1917, to June 30, 1917.

No.	Classification.	Balance April 1, 1917.	Expenditure
1.	Poultry Husbandry	.....	.....
2.	Horticulture	$ 6,977 36	$ 6,977 36
3.	Bacon	* 1,974 59	1,974 59
4.	Schools of Agriculture	8,443 42	8,443 42
5.	Agricultural Teaching in Academies, Rural and Normal Schools	3,823 58	3,323 58
6.	District Representatives	1,035 57	1,035 57
7.	Experimental Union	.....	.....
8.	Clover and Alfalfa	.....	.....
9.	Seed Selection	.....	.....
10	Bee keeping	.....	.....
11.	School of Veterinary Science	5,000 00	5,000 00
12.	Dairying	.....	.....
13.	Drainage	149 85	149 85
14.	Domestic Science	1,518 50	1,518 50
15.	Maple Sugar	1,656 49	1,656 49
16.	Conferences, etc	1,066 63	1,066 63
		$ 31,645 99	$ 31,645 99

* Transferred to No. 6, District Representatives....$4,000.00.

PROVINCE OF QUEBEC.

Grant of 1917-18.

SUMMARY STATEMENT, April 1. 1917, to March 31, 1918.

No.	Classification.	Grant.	Expenditure	Cr. Balance.
1.	Schools of Agriculture	$ 75,000 00	$ 57,399 68	$ 17,600 32
2.	School of Veterinary Science, building extension	5,000 00	5,000 00	
3.	Breeding	7,000 00	3,917 87	3,082 13
4.	Poultry	18,000 00	15,740 53	2,259 47
5.	Bacon	5,000 00	3,716 93	1,283 07
6.	Horticulture	30,000 00	29,994 42	5 58
7.	Experimental orchards	5,000 00	4,966 63	33 37
8.	Dairying	25,000 00	23,813 70	1,186 30
9.	Agricultural representatives	40,000 00	39,993 34	6 66
10.	Seed	9,000 00	9,000 00	
11.	Bee-keeping	7,000 00	7,000 00	
12.	Drainage	8,000 00	8,000 00	
13.	Maple products	4,000 00	1,375 27	2,624 73
14.	Short courses	9,113 76	7,914 49	1,199 27
15.	Experimental Union	2,000 00	2,000 00	
16.	Elementary Agricultural Education	10,000 00	5,631 54	4,368 46
17	Domestic Science	10,000 00	10,000 00	
18.	School Children's Exhibits	2,000 00	1,401 00	599 00
		$271,113 76	$236,865 40	$ 34,248 36

MACDONALD COLLEGE.

STATEMENT of receipts and disbursements of Dominion Grant for year ending March 31, 1918.

April 1, 1917—Balance (debit) forward		$ 2,947 62
Receipts—		
Instruction Act grant		25,000 00
		$22,052 38
Disbursements—		
Animal husbandry	$4,862 73	
Biology	1,006 54	
Cereal husbandry	2,226 57	
Chemistry	1,051 90	
Demonstrator, Shawville	2,209 70	
Horticulture	1,398 14	
Household science	2,625 11	
Physics	700 00	
Poultry	2,239 41	
Veterinary science	1,653 40	
Rural schools	3,751 47	
Short courses	497 06	
General	498 64	
Sherbrooke Exhibition	736 14	
		25,456 81
Debit balance		$ 3,404 43

PROVINCE OF QUEBEC—*Concluded.*

SCHOOL OF AGRICULTURE, STE. ANNE DE LA POCATIÈRE.

Expenditure of Federal Grant, 1917-18.

Building extension, annual payment	$ 6,000 00
Salaries and allowances, teaching staff	8,045 00
Administration, wages	1,745 00
Insurance, heating and lighting	4,330 00
Allowance for maintenance of students	2,855 48
Demonstration plots	2,000 00
Library	320 00
Dairying	500 00
Poultry-keeping	200 00
Incidentals	397 00
Bacon industry	450 00
Laboratory expenses	717 00
	$27,559 48

OKA AGRICULTURAL INSTITUTE.

Expenditure of Federal Grant, 1917-18.

Enlargement of College building, annual payment		$ 5,000 00
Teaching staff, salaries and allowances		9,745 00
Administration, salaries and wages		4,269 70
Insurance, heating and lighting		2,941 62
Experimental fields		384 68
Board of students		1,334 00
Poultry	100 00	
Bee-keeping	100 00	
Horticulture	200 00	
Preserving and canning	100 00	
Animal husbandry, herd improvement	1,175 00	
		1,675 00
Dusting machine		410 00
Incidentals		150 00
		$25,910 00

PROVINCE OF MANITOBA.

Grant of 1917-18.

SUMMARY STATEMENT, April 1, 1917, to March, 31, 1918.

Number.	Classification.	Balance April 1.	Grant.	Refunds.	Total Credits.	Expenditure.	Credit Balance.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1	Killarney Demonstration Farm and maintenance	1,483 04	3,000 00	1,244 67	5,727 71	5,514 66	213 05
2	Dairy work	.....	8,000 00	.....	8,000 00	4,950 32	3,049 68
3	Poultry work	.....	4,000 00	.....	4,000 00	1,847 77	2,152 23
4	Agricultural Representatives	227 63	15,500 00	37 00	15,764 63	8,032 79	7,731 84
5	Boys' and Girls' Clubs	32 95	17,000 00	308 60	17,341 55	17,227 10	114 45
6	Short Courses in Agriculture	179 41	19,113 11	2 60	19,295 12	15,723 31	3,571 81
7	Home Economics	145 54	18,500 00	27 50	18,673 04	18,371 91	301 13
8	Soil analysis and survey	.....	1,000 00	.....	1,000 00	.....	1,000 00
9	Bee-keeping	.....	2,000 00	.....	2,000 00	1,612 81	387 19
10	Miscellaneous	696 58	1,000 00	* 565 25	2,261 83	2,013 07	248 76
		2,765 15	89,113 11	2,185 62	94,062 88	75,293 74	18,770 14

Allotment for 1917-18	$ 77,113 11
Unappropriated Balance, 1916-17	12,000 00
	$ 89,113 11

* From sale of effects, Demonstration plots.

AGRICULTURAL AID ACT.

MANITOBA.

(1912-13.)

STATEMENT to March 31, 1918.

Demonstration farms	$ 5,425 90
Demonstration trains	3,278 45
Agricultural meetings—lectures	1,046 10
Ploughing matches	230 98
Poultry industry	985 20
Grants to agricultural societies	18,718 65
	$29,685 28
Balance unexpended	2,184 33
	$31,869 61

PROVINCE OF SASKATCHEWAN.

Grant of 1917-18.

SUMMARY STATEMENT, April 1, 1917, to March 31, 1918.

Number.	Classification.	Balances April 1.	Grant.	Refunds.	Total Credits.	Expenditure.	Credit Balance.
	College of Agriculture.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1	Staff Salaries, Research and Extension Service	13,644 57	22,076 16	548 09	36,268 82	29,551 60	6,717 22
2	Women's work ; Homemakers' Clubs	.....	5,500 00	.....	5,500 00	.....	5,500 00
	Instruction and Demonstration.						
3	Co-operation and Marketing	1,000 00	4,500 00	696 12	6,196 12	5,998 83	197 29
4	Animal Husbandry	2,500 00	4,500 00	274 82	7,274 82	3,146 15	4,128 67
5	Dairying	2,656 71	4,800 00	1,253 88	8,710 59	4,965 37	3,745 22
6	Field Husbandry and Weed Control	5,000 00	5,000 00	5 00	10,005 00	4,975 79	5,029 21
7	Demonstration Trains	4,000 00	3,595 71	61 50	7,657 21	6,728 97	928 24
8	District Representatives	10,000 00	2,500 00	.....	12,500 00	2,047 34	10,452 66
9	Veterinary Short Courses	.....	500 00	.....	500 00	265 30	234 70
10	Junior extension work	.....	1,180 45	.....	1,180 45	.....	1,180 45
	Elementary Agricultural Education.						
11	Agricultural Instruction in Public, High and Normal Schools ; Household Science	17,174 57	25,000 00	223 10	.....	18,451 56	23,946 11
12	School Fairs	.....	2,576 16	.....	.....	70 05	2,506 11
		55,975 85	81,728 48	3,062 51	95,793 01	76,200 96	64,565 88

PROVINCE OF ALBERTA.

Grant of 1917-18.

SUMMARY STATEMENT, April 1, 1917, to March, 31, 1918.

Number.	Classification.	Balance April 1, 1917.	Grant.	Total Credits.	Expenditure.	Dr. Balance.	Cr. Balance.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1	Schools of agriculture—						
	(a) Maintenance	10,265 51	35,000 00	45,265 51	35,826 51	.....	9,439 00
	(b) Equipment (Dr.)	1,127 59	2,000 00	872 41	204 19	.....	668 22
2	Demonstration farms	608 62	8,000 00	8,608 62	8,374 38	.....	233 74
3	Demonstration trains (Dr.)	190 75	5,000 00	4,809 25	6,817 85	2,008 60	
4	Dairying	1,907 03	1,500 00	3,407 03	28 00	.....	3,379 03
5	Publicity	1,403 01	2,400 00	3,803 01	2,037 54	.....	1,765 47
6	Women's work	817 86	4,500 00	5,317 86	5,522 50	204 64	
7	Agricultural representatives	293 59	8,500 00	8,206 41	10,579 85	2,373 44	
8	Miscellaneous	853 85	65 62	919 47	.....	.....	919 47
	Items from previous Agreement.						
	Provincial Instructors—Dairying	611 87	.....	611 87	750 00	138 13	
	Interest accrued	1,197 90	.....	1,197 90 784 90	.....	.....	1,982 62
		16,053 72	66,965 62	83,804 04	70,141 32	4,724 81	18,387 53

PROVINCE OF BRITISH COLUMBIA.

Grant, 1916-17.

SUMMARY STATEMENT, April 1, 1917, to June 30, 1917.

Number.	Classification.	Balances April 1, 1917.	Refunds.	Total Credits.	Expenditure.	Dr. Balance June 30, 1917.	Cr. Balance, June 30 1917.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts	$ cts.
1	Instructors and inspectors in agriculture	1,836 99	.....	1,836 99	7,557 97	5,720 98	
2	Farm demonstrations and demonstration plots	7,324 54	591 48	7,916 02	5,299 47	.....	2,616 55
3	Demonstration in Horticulture	4,983 75	31 90	5,015 65	2,844 83	.....	2,170 82
4	Printing and preparing Bulletins	4,451 30	13 75	4,465 05	1,711 88	.....	2,753 17
5	Agricultural Instruction in Schools	.....	.....	.....	.....	.....	
6	Miscellaneous	924 83	.....	924 83	398 54	.....	526 29
		19,521 41	637 13	20,158 54	17,812 69	5,720 98	8,066 83

Net balance carried forward to Section No. 1. 1917-18. ..... $2,345.85

PROVINCE OF BRITISH COLUMBIA.

Grant of 1917-18.

SUMMARY STATEMENT July 1, 1917-March 31, 1918.

Number.	Classification.	Balance July 1.	Grant.	Refunds.	Total Credits.	Expenditure.	Dr. Balance.	Cr. Balance.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1	Instructors and agricultural reps	2,345 85	3,500 00	208 80	6,054 65	7,170 50	1,115 85	.....
2	Field crop demonstration stations	.....	*4,000 00	3,860 59	7,860 59	8,507 93	647 34	.....
3	Horticultural demonstration stations	.....	3,000 00	21 98	3,021 98	1,300 85	.....	1,721 13
4	Poultry	.....	1,500 00	1,087 03	2,587 03	1,638 21	.....	948 82
5	Alfalfa plots	.....	500 00	.....	500 00	.....	.....	500 00
6	Silo demonstrations	.....	3,000 00	10 00	3,010 00	2,242 89	.....	767 11
7	Drainage	.....	1,000 00	47 14	1,047 14	271 98	.....	775 16
8	Seed	.....	5,500 00	33 20	5,533 20	1,892 73	.....	3,640 47
9	Dairying	.....	3,000 00	.....	3,000 00	1,714 88	.....	1,285 12
10	Bee-keeping	.....	*1,250 00	225 00	1,475 00	2,369 12	894 12	.....
11	Field crop competitions	.....	2,000 00	.....	2,000 00	2,265 27	265 27	.....
12	Boys' and girls' clubs	.....	1,000 00	11 00	1,000 00	499 95	.....	511 05
13	Fruit packing schools	.....	1,000 00	.....	1,000 00	15 00	.....	985 00
14	Market work	.....	4,500 00	.....	4,500 00	3,250 06	.....	1,249 94
15	Publications	.....	5,000 00	371 08	5,371 08	4,281 97	.....	1,089 11
16	Pathological and entomological investigations	.....	2,000 00	75 00	2,075 00	1,213 86	.....	861 14
17	Weed investigation	.....	1,500 00	.....	1,500 00	141 80	.....	1,358 20
18	Elementary Agricultural Education	.....	20,000 00	.....	20,000 00	16,484 28	.....	3,515 72
19	Miscellaneous	.....	699 06	1,427 47	2,126 53	1,573 02	.....	553 51
		2,345 85	63,949 06	7,378 29	73,673 20	56,834 30	2,922 58	19,761 48

*Payment of $4,000 under Section 2 and of $1,250 under Section 10 withheld pending adjustment.

BRITISH COLUMBIA.

Agricultural Aid Grant, 1912.

April 1, 1916, to August 20, 1916.

April 1, 1916—Balance brought forward	$606 69	
April 1 to August 20—Expenditure on account of women's institutes		$605 29
Balance carried forward to Agricultural Instruction		1 40
	$606 69	$606 69

PROVINCE OF NOVA SCOTIA.

Grant of 1917-18.

SUMMARY STATEMENT, April 1, 1917, to March 31, 1918.

Number	Classification.	Balances April 1, 1917.	Grant.	Refunds.	Total Credits.	Expenditure.	Cr. Balance.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1	College of Agriculture, interest and sinking fund, science building	2,494 27	8,000 00	.....	10,494 27	8,707 60	1,786 67
2	College salaries and maintenance	131 07	23,000 00	.....	23,131 07	23,114 91	16 16
3	Agricultural Representatives	866 51	9,500 00	.....	10,366 51	10,366 23	0 28
4	Short Courses	260 55	2,400 00	.....	2,660 55	2,038 34	622 21
5	Dairying	460 49	3,500 00	.....	3,960 49	3,913 68	46 81
6	Poultry	404 37	1,500 00	.....	1,904 37	1,810 43	93 94
7	Bee-keeping	49 38	600 00	.....	649 38	568 02	81 36
8	Drainage	.....	1,500 00	.....	1,500 00	1,247 12	252 88
9	Soils and fertilizer	578 03	1,500 00	.....	2,078 03	2,042 18	35 85
10	Field Crops	.....	1,500 00	.....	1,500 00	1,307 81	192 19
11	Fruit Growing	0 18	2,000 00	.....	2,000 18	1,938 01	12 17
12	Women's Work	837 05	3,000 00	.....	3,837 05	2,197 52	1,639 53
13	Entomological Work	1 34	10,000 00	.....	10,001 34	9,996 39	4 95
14	Agricultural Instruction	2,337 99	10,000 00	110 29	12,448 38	8,807 63	3,640 65
15	School Children's Exhibits and Competitions	.....	2,000 00	.....	2,000 00	1,879 95	120 05
16	Contingencies	202 47	1,716 69	.....	1,919 16	1,356 83	562 33
		8,623 70	81,716 69	110 29	90,450 68	81,342 65	9,108 03

PROVINCE OF NEW BRUNSWICK.

Grant of 1917-18.

SUMMARY STATEMENT, April 1, 1917, to March 31, 1918.

Number	—	Balances April 1, 1917.	Grant.	Refunds.	Total Credits.	Expenditure.	Dr. Balance.	Cr. Balance.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1	Agricultural schools—Equipment and furnishings	.....	.....	.....	.....	.....	.....	.....
2	Agricultural schools—Salaries	2,364 49	.....	92 00	2,456 49	2,126 66	.....	329 83
3	Agricultural representatives	.....	13,500 00	2 10	13,502 10	8,685 27	.....	4,816 83
4	Bee-keeping	.....	900 00	.....	900 00	796 51	.....	103 49
5	Soils and drainage	.....	4,000 00	572 55	4,572 55	4,250 85	.....	321 70
6	Horticulture	.....	6,500 00	69 55	6,569 55	6,197 83	.....	371 72
7	Short courses	.....	1,300 00	.....	1,300 00	365 04	.....	934 96
8	Live stock	.....	7,000 00	.....	7,000 00	6,377 16	.....	622 84
9	Dairying	.....	4,000 00	18 86	4,018 86	3,242 78	.....	776 08
10	Poultry	.....	2,100 00	.....	2,100 00	2,124 67	24 67	.....
11	Fertilizers	.....	2,000 00	.....	2,000 00	741 11	.....	1,258 89
12	Entomology	.....	1,300 00	.....	1,300 00	1,276 43	.....	23 57
13	Agricultural societies	.....	4,000 00	.....	4,000 00	2,655 08	.....	1,344 92
14	Women's institutes	282 95	6,000 00	139 40	6,422 35	6,324 38	.....	97 97
15	Elementary agricultural education	1,748 20	9,785 80	22 79	11,556 79	13,275 94	1,719 15	.....
16	School fairs	.....	1,725 00	.....	1,725 00	.....	.....	1,725 00
	1916-1917—Contingencies and miscellaneous	425 88	.....	.....	425 88	485 82	59 94	.....
		4,821 52	64,110 80	917 25	69,849 57	58,925 53	1,803 76	12,727 80
	Net credit balance	.....	.....	.....	.....	.....	.....	10,924 04

PROVINCE OF PRINCE EDWARD ISLAND.

Grant of 1917-18.

SUMMARY STATEMENT, April 1, 1917, to March 31, 1918.

Number.	Classification.	Balance April 1, 1917.	Grant.	Refunds.	Total Credits.	Expenditure.	Cr. Balance.
		$ cts.	$ cts.	$ cts.	$ cts	$ cts.	$ cts.
1	Buildings account: Equipment and maintenance, agricultural halls....	29 70	2,950 00	348 00	3,327 70	3,195 43	132 27
2	Director and district representatives.	... .	7,000 00	....	7,000 00	6,629 80	370 20
3	Short courses in agriculture.....	.. ..	250 00	.... .	250 00	108 04	141 96
4	Drainage and soils..... ..	.....	3,600 00	594 27	4,194 27	3,895 88	298 39
5	Dairying	.....	2,400 00	....	2,400 00	2,398 12	1 88
6	Bee-keeping and fruit-growing	... .	300 00	4 40	304 40	244 95	59 45
7	Women's institutes.....	30	3,500 00	100 00	3,600 30	3,322 71	277 59
8	Elementary agricultural education; agricultural instruction in public and high schools, training of teachers, allowances, grants, maintenance of Rural Science Department, Prince of Wales College	.....	9,500 00	80	9,500 80	9,027 61	473 19
9	Contingencies, including clerical assistance.....	87	2,249 22	.....	2,250 09	1,899 88	350 21
	Totals	30 87	31,749 22	1,047 47	32,722 42	30,722 42	2,105 14

4. VETERINARY COLLEGES.

The number of students, British subjects, enrolled in 1916-17 at the institutions entitled under the Agricultural Instruction Act to participate in the grant of 1917-18 to veterinary colleges was as follows:—

Ontario Veterinary College..	105
School of Veterinary Science, Montreal..	62

Based on the above enrolment, the grant was divided as follows:—

Ontario Veterinary College..	$12,574 85
School of Veterinary Science..	7,425 15
	$20,000 00

Ontario Veterinary College.—No payment was made to the Ontario Veterinary College during the year, there being sufficient funds on hand from the grant of 1914-15 to meet disbursements.

Financial Statement to March 31, 1918.

Balance on hand, April 1, 1917..		$13,736 64
Salaries of lecturers and demonstrators.	$3,061 30	
Laboratory..	538 18	
Printing and advertising..	999 15	
Supplies and incidentals..	1,989 30	
Balance on hand, March 31, 1918..	7,147 81	
		$13,736 64

School of Veterinary Science, Montreal.—The grant to this institution for 1917-18, amounting to $7,425.15, paid in November, 1917, was expended as follows:—

Salaries of teaching staff..	$6,510 00
Equipment..	415 30
Laboratory work..	499 85
	$7,425 15

5. RECAPITULATION OF APPROPRIATIONS UNDER THE AGRICULTURAL INSTRUCTION ACT.

—	1913-14.	1914-15.	1915-16.	1916-17.	1917-18.
	$ cts.	$ cts.	$ cts	$ cts.	$ cts.
Prince Edward Island	26,529 85	27,832 81	29,138 28	30,443 75	31,749 22
Nova Scotia	54,288 45	61,144 45	68,001 87	74,859 28	81,716 69
New Brunswick	44,509 93	49,407 20	54,308 40	59,209 60	64,110 80
Quebec	159,482 40	187,409 16	215,310 70	243,212 23	271,113 76
Ontario	195,733 32	230,868,83	266,013 64	301,158 45	336,303 26
Manitoba	51,730 05	58,075 45	64,421 31	70,767 21	77,113 11
Saskatchewan	54,296 29	61,152 31	68,011 04	74,869 76	81,728 48
Alberta	46,094,95	51,310 41	56,528 82	61,747 22	66,965 62
British Columbia	47,334 76	52,799 38	58,265 94	63,732 50	69,199 06
Veterinary Colleges	20,000 00	20,000 00	20,000 00	20,000 00	20,000 00
Totals	700,000 00	800,000 00	900,000 00	1,000,000 00	1,100,000 00

ONTARIO.

COMPARATIVE STATEMENT of appropriations for agricultural purposes for the years 1915, 1916, 1917, 1918, to October 31.

Service.	1915.	1916.	1917.	1918.
	$ cts.	$ cts.	$ cts.	$ cts.
Department of Agriculture—				
Salaries, contingencies, incidentals and miscellaneous	98,021 72	87,137 90	119,031 00	250,858 26
Agricultural Representatives	35,917 01	82,299 36	80,600 00	80,600 00
Live Stock Interests—				
Grants, Winter Fairs, Grants to Poultry Association, Horse Shows, Stallion Registration, Sheep experiments, etc., Spring Shows	43,079 35	37,314 11	46,450 00	56,693 74
Dairy Interests—				
Grants: Instruction and Inspection, Dairy School	54,601 40	56,698 72	142,297 00	148,819 95
Agricultural and Horticultural—				
Insurance, Field Crop Competitions and Judges, Exhibitions Special Grants	123,867 11	158,216 36	154,750 00	176,750 00
Institute—Farmers' and Women's	23,187 08	27,305 31	30,800 00	46,800 00
Fruits Interests—				
Grants, Spraying Assistance, Special Crop Experiments, Horticultural Experiment station, Apiary Inspection Demonstration work	49,515 68	46,949 41	55,100 00	75,650 00
Ontario Veterinary College—				
Salaries and Expenses	28,989 05	23,231 08	31,229 00	32,450 00
Ontario Agricultural College, Macdonald Institute and Ontario Experimental Farm—Salaries and Expenses	289,315 94	290,405 04	322,092 00	371,409 00
Demonstration Farm, Northern Ontario	....	15,500 41	8,000 00	8,000 00
Totals	746,494 34	825,057 70	990,349 00	1,248,030 95

QUEBEC.

COMPARATIVE STATEMENT of Provincial Appropriations for agricultural purposes for the years 1916, 1917, 1918 and 1919, to June 30.

Service.	1916.	1917.	1918.	1919.
	$ cts.	$ cts.	$ cts.	$ cts.
Civil Government Salaries and Contingencies	45,424 05	45,800 00	46,500 00	50,850 00
Agricultural Schools	30,000 00	30,000 00	30,000 00	40,000 00
Housekeeping Schools	8,518 00	12,000 00	10,000 00	21,000 00
Agricultural Societies	105,061 96	115,000 00	100,000 00	120,000 00
Farmers' Clubs or Agricultural Circles, including grant to S. Shore Railway	148,020 10	85,000 00	100,000 00	255,000 00
Council of Agriculture	2,272 68	3,000 00	3,000 00	3,000 00
Horticultural and Agricultural Societies, Montreal and Provincial	1,000 00	1,500 00	1,500 00	1,000 00
Veterinary Instruction	6,500 00	5,500 00	5,500 00	6,000 00
Dairying	94,451 64	97,000 00	99,000 00	.....
Dairy Factory Inspection	.....	20,000 00	.....	144,000 00
Provincial Laboratory	4,000 00	2,000 00	2,000 00	4,000 00
Lectures on Agriculture	3,927 21	9,000 00	9,000 00	.....
Fruit Growing	4,605 33	5,000 00	5,000 00	6,000 00
Poultry Raising	2,126 47	3,000 00	3,000 00	6,000 00
Journal of Agriculture	26,624 30	27,000 00	27,000 00	27,000 00
Agricultural Merit	3,293 40	3,500 00	3,500 00	6,000 00
Exhibitions	30,500,00	32,000 00	30,000 00	34,000 00
Miscellaneous	35 00	100 00	100 00	.....
Totals	516,365 14	496,400 00	475,100 00	743,850 00

MANITOBA.

COMPARATIVE STATEMENT of Expenditure of Provincial Appropriations for Agricultural purposes for the years 1915, 1916, 1917 and 1918, to November 30.

Service.	1915.	1916.	1917.	1918.
	$ cts.	$ cts.	$ cts.	$ cts.
Department—Salaries	14,555 00	12,522 26	14,600 00	13,316 00
" Office Expenses	1,727 81	1,990 39	2,000 00	1,500 00
Agricultural Societies and Farmers' Institutes	48,145 78	45,787 69	108,050 00	122,495 00
General Agriculture	9,799 69	23,429 90		
Grants to Live Stock Associations, Winter Fairs, Exhibitions and Societies	5,707 72	12,895 82		
Manitoba Agricultural College—				
Salaries	103,709 95	101,369 45	191,370 00	205,135 00
Maintenance	65,791 83	75,246 52		
Publicity	.....	.....	22,800 00	20,100 00
Birtle Demonstration Farm	.....	.....	.....	2,560 00
Miscellaneous	.....	.....	5,000 00	2,000 00
Totals	249,437 78	273,242 04	343,820 00	367,166 00

SASKATCHEWAN.

COMPARATIVE STATEMENT of Provincial Appropriations for agricultural purposes for the years 1915, 1916, 1917 and 1918, to April 30.

Service.	1915.	1916.	1917.	1918.
Department—Salaries and general expense	66,347 93	40,795 00	34,830 00	35,130 00
General agricultural interests, Agricultural Societies, Provincial Organization, Grants and Contingencies	68,549 34	67,600 00	67,600 00	63,000 00
Live Stock Industry	35,636 95	30,300 00	32,700 00	50,000 00
Dairy and Poultry Industry	87,986 43	71,100 00	16,300 00	15,200 00
Agricultural Statistics and Publicity	26,635 82	26,900 00	21,600 00	18,000 00
Bacteriological Laboratory	8,040 88	8,400 00	.....	.....
Weed Control, Seed Inspection, Exhibition	18,272 69	8,900 00	10,000 00	11,300 00
Game Protection	.....	10,100 00	11,200 00	14,160 00
Bureau of Labour—Farm and domestic labour and factory inspection	7,594 60	9,600 00	10,100 00	11,700 00
Miscellaneous Services—Vital statistics, Natural History Scholarships, Brands, etc.	21,235 31	9,100 00	1,100 00	500 00
Totals	340,299 95	282,795 00	205,830 00	218,990 00
Less Revenue	104,283 41	95,500 00	37,000 00	.....
	236,016 54	187,295 00	168,830 00	.....

ALBERTA.

COMPARATIVE STATEMENT of Provincial Appropriations for agricultural purposes for the years 1915, 1916, 1917 and 1918.

Service.	1915.	1916.	1917.	1918.
Civil Government	$ 48,329 94	$ 49,520 00	$ 54,940 00	$ 45,480 00
Live Stock—				
Live stock and agricultural institutes and associations; fat stock shows; destruction of wolves; stock inspection; brands and brand book; grants to live stock associations; spring stock show	47,736 83	46,100 00	52,700 00	62,500 00
Fairs and Exhibitions—				
Official judges; production of pure seed grain, and Seed Fair, Fairs Association, agricultural societies	117,226 18	121,500 00	.....	136,600 00
Poultry—				
To encourage poultry industry; grant to Poultry Association	8,390 37	8,200 00	8,700 00	.....
Dairying—				
Advances to creameries; to encourage dairy work	249,851 53	19,500 00	19,500 00	38,594 60
Demonstration Farms—				
Administration and operation	70,231 95	65,000 00	65,000 00	66,000 00
Schools of Agriculture—				
Operation; agricultural instruction; scholarships	20,503 11	20,500 00	20,000 00	20,000 00
Statistics; protection of game; prairie fires	45,371 79	32,500 00	36,000 00	57,310 70
Grants—				
United Farmers' Irrigation Association; destruction of noxious weeds; Natural History Society	27,640 66	30,000 00	35,000 00	25,000 00
Bacteriological and pathological work	9,000 00			
Sundries and contingencies	1,694 19	1,000 00	1,200 00	
	$ 645,786 55	$ 393,820 00	$ 406,040 00	$ 451,485 30

BRITISH COLUMBIA.

COMPARATIVE STATEMENT of Provincial Appropriations for agricultural purposes for the years 1915, 1916 and 1917, to March 31, 1918.

Service.	1915-16.	1916-17.	1917-18.
	$ cts.	$ cts	$ cts.
Salaries—Agricultural Branch, Department of Finance and Agriculture	62,919 70	73,496 00	65,752 00
Agricultural Associations	16,709 33	30,000 00	20,000 00
Board of Horticulture	318 85	500 00	500 00
Grants to various associations	4,322 63	5,250 00	5,750 90
Grants to students; compensation for cattle; services and expenses, outside; miscellaneous, weed suppression	77,336 31	67,000 00	58,000 00
Panama Exposition	7,322 92	.....	.....
Fruit Work—Fruit cooling and storage, fruit exhibitions, fruit packing schools, inspection nursery stock, fruit growers' associations demonstration orchards	36,649 76	43,750 00	33,500 00
Farmers' Institutes	18,108 45	20,000 00	15,000 00
Women's Institutes	.....	7,500 00	7,500 00
Poultry Association grant	5,213 60	2,500 00	.....
Dry farming experimental plots	.....	.....	2,000 00
	233,898 34	249,996 00	208,002 00

NOVA SCOTIA.

COMPARATIVE STATEMENT of Provincial Appropriations for agricultural purposes for the years 1915, 1916, 1917, 1918, to September 30.

Service.	1915.	1916.	1917.	1918.
	$ cts	$ cts.	$ cts.	$ cts.
General Agriculture—Department salaries and expenses	14,415 64	14,747 58	.....	.....
Assistance in dairying	1,849 69	1,783 87	.....	.....
Entomological inspection	2,938 06	3,910 31	.....	.....
Drainage	400 93	12 39	.....	.....
Exhibitions	10,484 08	5,540 17	.....	.....
Field crop competitions	936 07	1,022 71	.....	.....
Live stock improvement	.....	.....	.....	.....
Meetings	406 50	89 40	36,000 00	38,000 00
Model orchards	596 45	500 01	.....	.....
Printing and advertising	212 60	490 92	.....	.....
Miscellaneous	448 45	616 58	.....	.....
Fruit growers and county associations	1,200 00	1,450 00	.....	.....
Stallion enrolment	142 23	240 95	.....	.....
Assistance of poultry	423 20	632 65	.....	.....
Advertising fruit in Great Britain	.....	781 95	.....	.....
Agricultural College	18,300 00	19,000 00	19,000 00	.....
College farm	14,700 00	15,000 00	15,000 00	37,000 00
Agricultural societies	14,710 76	14,490 00	15,000 00	15,000 00
Total	82,164 66	84,309 95	85,000 00	90,000 00

NEW BRUNSWICK.

COMPARATIVE STATEMENT of Provincial Appropriations for agricultural purposes for the years 1915, 1916, 1917 and 1918, to October 31, 1918.

Service.	1915.	1916.	1917.	1918.
	$ cts.	$ cts.	$ cts.	$ cts.
Salaries and expenses—Department	7,945 14	9,914 76	9,558 00	10,916 66
Agricultural Societies	17,000 00	17,000 00	18,000 00	19,000 00
Live Stock Industries—Dairying	6,477 85	5,830 96	7,200 00	12,100 00
Farmers' Institute	738 05	285 42	600 00	.....
Horticulture	1,997 26	1,499 32	2,500 00	1,200 00
Poultry Raising	1,245 57	1,417 52	2,000 00	1,000 00
Crop Competitions—Seed Fairs	3,398 16	4,878 71	4,400 00	5,200 00
Miscellaneous	1,944 11	1,389 81	2,125 00	3,200 00
Brown Tail Moth, etc	3,754 45	3,370 79	2,912 00	3,300 00
Bonus Mud Dredges	519 90	.....	500 00	1,700 00
Bonus Clover Huilers	600 00	.....	.....	500 00
Limestone crusher and power	1,895 00	275 40	500 00	500 00
Bonus to Wheat Mills	.....	2,500 00	3,000 00	5,000 00
	47,515 79	48,362 69	53,295 00	63,916 66

PRINCE EDWARD ISLAND.

COMPARATIVE STATEMENT of Expenditure of Provincial Funds for Agriculture.

	1915. To Dec. 31.	1916. To Dec. 31.	1917. Appropriations.	1918. Appropriations.
	cts.	$ cts.	$ cts.	$ cts.
Farmers' Institutes	1,653 00	2,077 50	2,070 00	2,070 00
Field Crops, Horticulture, Dairying and Poultry	939 27	2,562 28	3,000 00	3,000 00
Exhibitions, Association Grants and Live Stock Judging	10,558 30	8,865 50	8,780 00	.....
Miscellaneous Department Expenses	10,785 76	2,772 73	5,850 00	5,850 00
Totals	23,936 33	16,278 01	19,700 00	10,920 00

DEPARTMENT OF AGRICULTURE

CANADA

REPORT

OF THE

VETERINARY DIRECTOR GENERAL

(F. TORRANCE, B.A., D.V.S.)

FOR THE

YEAR ENDING MARCH 31, 1918

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1919

[No. 15b—1919.]

The Honourable T. A. Crerar,

Minister of Agriculture.

Sir,—I have the honour to submit my report for the year ending March 31, 1918.

I have the honour to be, Sir,

Your obedient servant,

F. TORRANCE, B.A., D.V.S.,

Veterinary Director General.

REPORT

OF THE

VETERINARY DIRECTOR GENERAL.

OTTAWA, March 31, 1918.

INTRODUCTORY.

Absence on military service of a number of our veterinary inspectors, as well as others of our staff, has rendered it difficult at times during the past year, to carry on as we would like, but through the loyal efforts of our men and their willingness to do more than might reasonably be expected of them, our work has never flagged. The Meat and Canned Foods Inspection Division has had a strenuous year, owing to the enormous increase in the export of dressed meats and the new work undertaken in the inspection of meats during the loading of ships and the inspection of factories for the manufacture of oleomargarine. This has necessitated our inspectors working unusually long hours, but it has always been done cheerfully, and in no case has the work of inspection been delayed to the inconvenience of packers or shippers.

CONTAGIOUS DISEASES DIVISION.

It has been a good year for the health of Canadian livestock. Contagious pleuro-pneumonia, foot-and-mouth disease, and several other diseases which inflict great losses on agriculture in other parts of the world are still unknown in Canada. Those other diseases which we are constantly fighting have been kept within narrow bounds and with some of them satisfactory progress has been made toward their eradication. The various activities of this division are taken up under different heads as follows:—

GLANDERS.

A further reduction in the number of horses killed for this disease is shown in the total for this year of 188, compared with 228 killed in the previous year.

Year.	No. of Horses Destroyed.	Compensation Paid.
1908	1,324	$102,868 00
1909	981	73,386 00
1910	627	48,686 00
1911	666	57,122 00
1912	853	77,439 00
1913	638	60,271 00
1914	338	35,556 00
1915	330	34,556 00
1916	241	23,102 76
1917	228	22,238 95
1918	188	19,849 74

Dominion.—Fourteen were killed on inspection, 152 at first test, 22 at second test, 2 at third test; total 190 (valued at $29,955, at a cost of $19,849.74).

Sixty-nine showed clinical symptoms.

Eight thousand eight hundred and five horses and 152 mules were tested with mallein of which 185 reacted. One hundred and seventy-six reactors were destroyed the remaining 9 were returned to the United States. Of the 185 reactors 69 showed clinical symptoms of glanders at or during the test.

Eight horses are under control for retest.

Of the 176 horses slaughtered, 10 were killed without compensation.

Nova Scotia.—Seventy-two horses tested and proved to be healthy.

New Brunswick.—One hundred and eight horses tested and proved to be healthy

Quebec.—Ten were killed at first test, 1 killed at second test; total 11 (valued at $1,620, at a cost of $1,079.98).

Seven showed clinical symptoms.

Five hundred and eighty-eight horses and 1 ass were tested with mallein, of which eleven reacted and were destroyed. Of the 11 reactors, 7 showed clinical symptoms at or during the test. No horses are under control for retest.

Of the 11 slaughtered 1 was in the electoral district of Dorchester; 7 in the electoral district of Terrebonne, and 3 in the electoral district of Labelle.

Ontario.—Three hundred and twenty-eight horses, 3 mules, 5 asses tested and proved to be healthy.

Manitoba.—One thousand one hundred and seventeen horses, 14 mules, 4 jack asses tested and proved to be healthy.

Saskatchewan.—Fourteen were killed on inspection, 139 at first test, 19 at second test, 2 at third test; total 174 (valued at $27,620 at a cost of $18,293.12).

Sixty showed clinical symptoms.

Five thousand six hundred and two horses, 1 Shetland pony, 108 mules were tested with mallein, of which 166 reacted; 160 were destroyed and 6 returned to the United States. (Five entered Wood Mountain and 1 Big Muddy). Of the 166 reactors 60 showed clinical symptoms at or during the test.

Eight horses are under control for retest.

Of the 174 horses slaughtered, 23 were in the electoral district of Battleford, 7 in North Battleford, 33 in Kindersley, 6 in Humboldt, 18 in Last Mountain, 45 in Mackenzie, 7 in Maple Creek, 2 in Moose Jaw, 3 in Prince Albert, 3 in Saltcoats, 7 in Saskatoon, 9 in Swift Current, 11 in Weyburn.

Alberta.—Three were killed at first test, 2 in second test; total, 5 (valued at $715, at a cost of $476.64).

Two showed clinical symptoms.

Four hundred and seventy-eight horses and 6 mules were tested with mallein, of which 6 horses reacted; 5 were destroyed and 1 returned (entered Coutts, Alta.). Of the 6 reactors, 2 showed clinical symptoms at or during the test. No horses under control for retest.

Of the 6 slaughtered, 5 were in the electoral district of Macleod, 1 in Lethbridge.

British Columbia.—Five hundred and ten horses and 21 mules were tested with mallein, of which 2 reacted and were returned to the United States (1 entered Bridesville and 1 Huntingdon). No clinical symptoms.

Yukon Territory.—Two horses were tested at White Horse and proved healthy.

HOG CHOLERA.

This disease has been the occasion of much of the work of this division during the year, not on account of its extent, for there is a reduction in the number of outbreaks, but by reason of our strict enforcement of preventive measures. These include the inspection and licensing of all parties feeding hogs on garbage collected from premises other than those of the feeder. Licenses are issued without any fee, but only to parties whose premises have been inspected and found satisfactory from a sanitary point of view, and also provided with the equipment necessary for cooking the garbage. Licensees are frequently visited by our inspectors to make sure that garbage is properly cooked and premises kept clean. It has been found necessary in a few instances to prosecute parties found feeding garbage without the license required by law, and convictions were secured and fines imposed.

The use of serum in the control of hog cholera during the year has been continued with satisfactory results, and has effected a substantial saving of hogs and compensation. The double treatment with simultaneous injection of serum and virus has not been used, except in the case of one farm in Essex county, where, by special arrangement with the owner of a large herd, the double method was used for experimental purposes. The object was to ascertain whether hogs after treatment by the double method could convey the infection of hog cholera to susceptible hogs in contact with them. Untreated hogs were placed in the same pen with the treated hogs and allowed to remain with them under uniform conditions for a sufficient period of time to permit natural infection to take place if infectious material were present. The animals remained healthy throughout the experiment, and were slaughtered at an abattoir, where one of our inspectors gave their carcasses a very careful examination.

All were found perfectly healthy with one exception. This pig showed a few slight lesions of an indefinite character, which could not be identified with hog cholera. So far as it went, the experiment indicates that there is not much danger of double-treated hogs *which remain healthy themselves*, transmitting infection to others.

Experience has shown that the double method of protecting swine against hog cholera is sometimes guilty of causing outbreaks of the disease. These unfortunate results are not very frequent, and are not so often reported now as when the treatment was in its infancy and both field veterinarians and manufacturers of serum and virus were less skilful than now. But the occasional occurrence of these disasters is quite sufficient to cause hesitation in using the treatment in localities where the disease is unknown and in valuable herds not exposed to danger of infection from an outbreak in its immediate neighbourhood.

The use of serum has been continued with satisfactory results. It has saved us a large amount of compensation and preserved from destruction a large amount of valuable meat. This method of dealing with the disease is free from the dangers of the double method, and much better suited, in my opinion, to the conditions in Canada in regard to this disease.

Garbage feeding continues to be the source of nine-tenths of our hog cholera, and although we are taking great precautions to render innocuous any infective material in garbage by insisting on having it cooked, we are not altogether successful. We can and do insist on adequate cooking facilities in all licensed garbage-feeding premises, but unless an inspector were constantly present we cannot be sure that they are properly used.

It therefore happens that careless feeders will sometimes feed garbage that is only half-cooked or even raw and, when infective matter is present, an outbreak of disease occurs.

STATISTICS OF HOG CHOLERA.

	No. of Hogs Destroyed.	Compensation.
1909	1,881	$ 9,912 00
1910	1,127	7,087 00
1911	1,346	8,818 00
1912	4,249	23,446 00
1913	8,466	52,785 00
1914	34,779	196,981 00
1915	34,470	188,562 00
1916	5,700	33,695 00
1917	4,623	30,497 98
1918	2,212	13,031 20

In the Dominion, 2,212 hogs, valued at $26,864 were destroyed as diseased, at a cost of $13,031.20 in compensation.

Nova Scotia.—Six outbreaks of hog cholera occurred in Nova Scotia, in which 548 hogs, valued at $6,153, were destroyed in the undermentioned districts, at a cost of $2,877.30 in compensation.

Sixty-eight premises were also quarantined on suspicion, involving the control of 126 hogs.

District—	Number of Outbreaks.	Hogs Destroyed.
Antigonish and Guysborough	1	5
Cumberland	1	70
Halifax	3	472
Hants	1	1
	6	548

New Brunswick.—Two outbreaks of hog cholera occurred in New Brunswick in which 20 hogs, valued at $252, were destroyed in the undermentioned districts at a cost of $168 in compensation.

The premises of one owner were quarantined on suspicion, involving the control of six hogs.

District—	Number of Outbreaks.	Hogs Destroyed.
Royal	1	11
Westmoreland	1	9
	2	20

Quebec.—Ten outbreaks of hog cholera occurred in Quebec in which 231 hogs, valued at $3,027, were destroyed in the undermentioned districts, at a cost of $1,978 in compensation.

Six premises were also quarantined on suspicion, involving the control of 160 hogs.

District—	Number of Outbreaks.	Hogs Destroyed.
Champlain	1	2
Jacques Cartier	2	52
Laval-Two Mountains	1	2
Levis	1	60
Maisonneuve	2	95
Quebec West	1	17
Richelieu	1	1
Three Rivers and St. Maurice	1	2
	10	231

Ontario.—Forty outbreaks of hog cholera occurred in Ontario in which 976 hogs, valued at $12,306, were destroyed in the undermentioned districts at a cost of $6,535.92 in compensation.

One hundred and fifty-three premises were also quarantined on suspicion, involving the control of 2,046 hogs.

Twenty-nine hogs, valued at $404, were destroyed for purposes of examination, but no evidence of hog cholera was found.

District—	Number of Outbreaks.	Hogs Destroyed.
Algoma E. R.	1	1
Algoma W. R.	1	1
Carleton	1	10
Essex N. R.	2	40
Essex S. R.	1	8
Grey N. R.	1	4
Hamilton West	1	100
Hastings E. R.	1	151
Hastings W. R.	1	14
Huron N. R.	1	82
Kent	2	57
Lambton E. R.	4	65
Lincoln	2	45
Ontario S. R.	1	26
Parry Sound	1	39
Peel	1	19
Renfrew N. R.	2	99
Simcoe, N. R.	3	42
Temiskaming	1	1
Toronto South	2	74
Waterloo N. R.	1	14
Welland	3	20
Wellington N. R.	1	8
West York	2	27
York E. R.	1	4
York W. R.	1	8
York S. R.	1	7
	40	976

Manitoba.—Six premises were quarantined on suspicion, involving the control of 323 hogs.

Two hogs, valued at $27 were destroyed for purposes of examination, but no evidence of hog cholera was found.

Saskatchewan.—Five premises were quarantined on suspicion, involving the control of 75 hogs.

Two hogs, valued at $24 were destroyed for purposes of examination, but no evidence of hog cholera was found.

Alberta.—Four outbreaks of hog cholera occurred in Alberta, in which 437 hogs, valued at $5,126 were destroyed in the undermentioned districts at a cost of $1,471.98 in compensation.

Thirty-four premises were also quarantined on suspicion, involving the control of 879 hogs.

Seven hogs valued at $83 were destroyed for purposes of examination, but no evidence of hog cholera was found.

District—	Number of Outbreaks.	Hogs Destroyed.
Bow River	1	8
East Calgary	1	373
East Edmonton	1	53
Macleod	1	3
	4	437

British Columbia.—The premises of one man were quarantined on suspicion, involving the control of 11 hogs.

One hog, valued at $7, was destroyed for purposes of examination, but no evidence of hog cholera was found.

DOURINE.

Since the discovery of the complement fixation test for the diagnosis of this disease, steady progress has been made in its eradication. Some difficulty has been experienced in cleaning up the herds on the Blood Indian reserve, but even in this last stronghold of the disease, satisfactory work has been done, and we hope before long to have the disease entirely stamped out in Canada.

	Horses Destroyed.	Compensation.
1913	18	$ 2,096 00
1914	394	32,080 00
1915	382	31,363 00
1916	220	16,666 00
1917	48	3 222 63
1918	16	1,340 66

A total of 16 animals, valued at $2,011, were slaughtered as being affected with this disease, at a cost of $1,340.66, distributed as follows:—

District—	Province.	Suspected and Quarantined.	Slaughtered.
Battleford	Saskatchewan.	3	
Kindersley	"	4	
Maple Creek	"	44	1
Prince Albert	"	8	
Saskatoon	"	1	
Bow River	Alberta.	185	
Lethbridge	"	44	2
Macleod	"	..	13
Medicine Hat	"	2	
Victoria	"	12	
Red Deer	"	1	
		304	16

One horse, inspected for entry at Bridesville (electoral district of Yale), B.C., was returned to the United States suspected of being infected with dourine.

SCABIES OR MANGE.

A few scattered outbreaks of horse mange have occurred and been dealt with successfully by our inspectors.

Cattle mange is a much more serious proposition, and has given the department much concern for many years. Fortunately the disease in Canada is confined to a definite area in southern Alberta and the neighbouring part of Saskatchewan. The rest of Canada is free from cattle mange. The cattle in the affected area are under restrictions which prohibit their movement outside the area unless for immediate slaughter at a certain designated abattoir, or, unless, in the case of cattle for other purposes than immediate slaughter, they have been twice dipped under the supervision of one of our officers. Herds within the area which are known to be mangy are kept under quarantine and required to be dipped under supervision.

These measures are gradually lessening the extent of the infection, and as soon as part of the area is known to have been freed from infection, it is released from restrictions on the movement of cattle. In this way we have from time to time, as circumstances permitted, reduced the area known as the "mange area."

Scabies in sheep or "sheep scab" is practically unknown in Canada. The only outbreak occurring during the year affected only five sheep on two premises in Manitoba. These were found in a rather remote Icelandic settlement in the northern part of the province and were successfully treated under the supervision of our officers.

HORSE MANGE.

Quebec.—One outbreak, 1 animal affected, 1 animal quarantined.

Manitoba.—One outbreak, 5 animals affected, 5 animals quarantined.

Saskatchewan.—Five outbreaks, 29 animals affected, 113 animals quarantined.

Alberta.—On one man's premises, 39 animals were quarantined on suspicion but mange did not develop.

A total of 6,311 horses and 7 mules were inspected on being presented for shipment from the quarantined area in Alberta and Saskatchewan.

CATTLE MANGE.

Province—	Outbreaks.	Animals Affected.	Animals Quarantined.
Saskatchewan	7	119	15,358
Alberta	33	1,227	66,877

Some 55,650 cattle were inspected on being presented for shipment from the quarantined area in Alberta and Saskatchewan, and 259,443 cattle were inspected in Winnipeg on arrival from points west thereof.

SHEEP SCAB.

In Manitoba, 5 animals on two premises were found to be affected with sheep scab, involving the control of 457 animals on fifteen premises as follows:—

District—	Affected.	Quarantined.
Lisgar	5	171
Portage la Prairie	..	19
Provencher	..	148
Springfield	..	119
	5	457

In accordance with the quarantine regulations, 43,975 sheep imported into Canada were quarantined for the prescribed period of thirty days.

RABIES.

In British Columbia, one owner's premises were quarantined in the district of Yale.

In Alberta one owner's premises were quarantined in the district of East Edmonton.

In Ontario, 52 premises were quarantined, distributed as follows:—

District—	Premises Quarantined.	District—	Premises Quarantined.
Brantford	1	Victoria and Haliburton	1
Durham	1	Welland	8
Haldimand	3	Wentworth	3
Hamilton West	1	West York	1
Huron N. R.	1	York E. R.	1
Lincoln	2	York, S. R.	2
Norfolk	5	York, W. R.	1
Peel	7		
Peterborough, W. R.	10		52
Toronto South	4		

No fatalities in human beings were reported.

ANTHRAX.

The following outbreaks were reported and dealt with during the year:—

Province—	Outbreaks.	Animals Quarantined.
Quebec	1	33
Ontario	1	93

Eighteen animals quarantined in Saskatchewan, but examination failed to reveal evidence of anthrax.

TUBERCULOSIS.

Municipal Testing.

After a year's experience in the working of the new tuberculosis regulations, it was decided to amend them in one or two respects with the object of extending their scope and making more liberal compensation for reactors. The regulations were, therefore, amended to permit them to apply to any city or town applying for federal aid. Formerly such aid was limited to cities and towns of a population of 5,000 or more. Compensation was raised to two-thirds the appraised value of the animal from one-third formerly, so that the owner of a reactor destroyed under these regulations may now receive a maximum of $53.33 for a grade cow, or $166.66 for a pure-bred registered one.

These changes have been very satisfactory to the dairymen, and have resulted in a wider extension of the work of control. Ottawa and North Battleford applied for federal aid and during the year the first test was applied to the herds supplying both these places. No unpleasant friction between owners and the department was observed, and a number of reactors were got rid of which had been regularly supplying milk to the citizens.

The importance of this work to the health of a community can hardly be overestimated, especially to the welfare of the child population. It was found by our tests that some herds were supplying milk to be consumed in the raw unpasteurized state, when almost every cow in the herd was diseased. This milk must have been highly dangerous for the children drinking it, yet the parents were probably quite satisfied if its appearance and taste were all right.

Experiments have proved that young pigs fed on tuberculous milk become tuberculous to the extent of 80 per cent if they receive only two or three feeds of it. When fed continuously on it for a month, 100 per cent became infected.

There is no reason to believe that children are not equally susceptible to the effect of consuming tuberculous milk. The results are not so evident as in the case of pigs, but far more disastrous to the human race. Much human tuberculosis comes from drinking tuberculous milk, and every effort should be made to prevent it by putting the tuberculous cow out of business.

Urban municipalities might well give some consideration to this important health matter, and protect the lives of the little ones by permitting only wholesome milk, free from tuberculosis to be sold. The tuberculosis regulations show how easily, and at how little cost to a town this may be done.

Since this work was begun there have been over seven hundred diseased cows removed from the dairies supplying four cities and towns. The evil potentialities of seven hundred diseased cows in spreading tuberculosis cannot be estimated. We can only be thankful that their opportunity is gone, and hope that the evil they have done will not live after them.

Statistics on this work are difficult to compile. Dairymen seldom retain a cow more than a year or two. Sometimes it is the practise to sell a cow as soon as her

period of lactation is finished, and to replace her with another which is just commencing or, in the parlance of the dairy, a "springer.' This continual changing of cows makes the work of testing almost a continuous performance.

Cows to replace those sold out of the dairy, or condemned as reactors to the test, must be tested by our inspector before being added to a clean herd, and it is therefore found impracticable to test these herds, as we do breeding herds, by regular semi-annual tests. For the same reason, the figures of testing can never be completed, and we can only report the number tested to this date and the number of reactors found.

Municipal Testing to March 31, 1918.

	Tests Made.	Reactors.	Per cent.
North Battleford	929	101	10·8
Saskatoon	9 144	292	3·1
Regina	3,579	146	4·07
Ottawa	2,151	166	7·7
Total	15 803	705	4·46

N.B.—The number of tests made does not correspond with the number of cows tested, as many of the cows have been tested more than once, and some of them oftener.

Saskatoon Statistics.—Seven hundred and thirty-five cattle were submitted to first test, 481 to second test, 423 to third test, 291 to fourth test, 62 to fifth test, 2 to sixth test.

Thirty-four reactors slaughtered, value $2,185, compensation $1,416.66, 3 reactors, purchased subject to test, returned previous owners, 4 reactors, owner's license cancelled, 1 reactor, not yet slaughtered, a total of 42 reactors.

In addition to the above, 3 animals which reacted, 1916-17, were slaughtered this year, value, $270; compensation, $90.

Regina Statistics.—One thousand one hundred and fifty cattle were submitted to first test, 255 to second test, 74 to third test, 57 to fourth test.

Eighty-one reactors slaughtered, value, $4,703; compensation, $3,135.33.

One reactor slaughtered without supervision, not valued.

Three reactors removed from premises.

Three reactors not yet slaughtered, a total of 88 reactors.

North Battleford.—Two hundred and seventy-one cattle were submitted to first test, 85 to second test.

Forty-eight reactors slaughtered, value, $2,770; compensation, $1,846.66.

Ottawa.—One thousand and eighteen cattle were submitted to first test, 39 to second test.

One hundred and eighteen reactors slaughtered, value, $7,006; compensation, $4,660.66.

One reactor died.

Twenty-three reactors not yet slaughtered, a total of 142 reactors.

A total of 833 cattle were tested on being imported into Canada, 10 of which reacted, 5 were classed as suspicious, and 818 proved healthy; 1,067 cattle were tested for export, 32 of which reacted, 7 were classed as suspicious, and 1,028 proved healthy; 3,025 cattle were tested, some for shipment to different provinces of the Dominion and others in herds under supervision of this department, 252 of which reacted, 54 were classed as suspicious, and 2,719 proved healthy; 4,582 cattle were tested by private practitioners, 476 of which reacted, 104 were classed as suspicious, and 4,002 proved healthy; all reactors were permanently earmarked by a veterinary inspector.

IMPORT INSPECTIONS.

Import inspections from United States and Newfoundland were: 56,649 horses, 11,102 mules, 8,301 cattle, 43,975 sheep, 204 swine, 480 goats, 11 asses, 7 donkeys, 4 camels, 2 dogs, 2 elephants, 6 Shetland ponies, 9 ponies.

Import inspections from Europe and elsewhere were: 62 horses, 613 cattle, 903 sheep, 5 goats.

A total of 5,297 horses were tested on arrival from the United States and allowed to proceed to their destination.

PURE-BRED IMPORTS.

HORSES.

Breed—	Great Britain.	United States.	Total.
Belgian	....	58	58
Clydesdale	45	10	55
Percheron	....	252	252
Shire	1	5	6
Standard	....	43	43
Thoroughbred	16	11	27
Welsh Ponies	....	10	10
Total	62	389	451

CATTLE.

Breed—	Great Britain.	United States.	Total
Aberdeen Angus	41	114	155
Ayrshire	54	5	59
Brown Swiss	....	7	7
Galloway	1	....	1
Guernsey	....	13	13
Hereford	....	150	150
Holstein	....	17	17
Jersey	....	23	23
Polled Angus	....	2	2
Shorthorn	514	58	572
West Highland	3	....	3
Total	613	389	1,002

GOATS.

Breed—	Great Britain.	United States.	Total.
Anglo-Nubian	5	....	5
K.C.	....	5	5
Toggenburg	..	11	11
Total	5	16	21

SHEEP.

Breed—	Great Britain.	United States.	Total.
Cheviot	6	....	6
Cotswold	25	....	25
Hampshire	20	....	20
Horned Dorset	....	6	6
Leicester	17	6	23
Lincoln	178	....	178
Oxford	40	....	40
Romney Marsh	282	....	282
Shropshire	308	4	312
Southdown	10	....	10
Suffolk	1	....	1
West Highland	2	....	2
Total	889	16	905

SWINE.

Breed—	Great Britain.	United States.	Total.
Berkshire	....	2	2
Chester White	....	45	45
Duroc Jersey	....	2	2
Ohio Improved Chester	..	6	6
Poland	....	2	2
Total	....	57	57

DISEASED IMPORTS.

Port.	No. Animals in Infected Shipment.		No. of Shipments.	No. of Animals Infected.	Origin.	Action.
Highwater, Que.	Horses	1	1	1	United States.	Returned.
Wood Mountain, Sask.	"	47	5	5	"	All returned.
Big Muddy, Sask	"	1	1	1	"	Returned.
Saskatchewan General	"	19	2	2	"	Reactors destroyed
Coutts, Alta.	"	2	1	1	"	Both returned.
Bridesville, B.C	"	6	2	2	"	All returned.
Huntingdon, B.C.	"	1	1	1	"	Returned.
		77	13	13		

ANIMALS INSPECTED FOR EXPORT.

Port.	Horses.	Cattle.	Sheep.	Swine.
Charlottetown to Newfoundland	73	386	310	476
Summerside to Newfoundland	....	....	10	
Halifax to Newfoundland	4	....	....	
" Great Britain	1,688	....	....	
" St. Pierre and Miquelon	1	41	6	
" Bermuda	22	49	8	4
Sydney to Newfoundland	144	1,594	126	123
" St. Pierre and Miquelon	1	2	....	
St. John to Bermuda	3	6	....	30
" United States	....	....	32	
Toronto to United States	....	12,482	16,313	350
Total	1,936	14,560	16,805	983

LABORATORIES.

The staff of the Biological Laboratory at Ottawa has had a busy year. The output of biological products has increased. The following table will show the number of doses of biological products disbursed at the Laboratory during the year:—

Month.	Mallein.	Tuberculin.	Tuberculin Special.	Single Blackleg Vaccine.	Double Blackleg Vaccine.	Anthrax Vaccine.	Strangles Vaccine.
April	2,025	2,400	.....	49,570	500	32	.....
May	.....	2,000	.....	21,890	660	20*	100
June	2,025	2,260	200	17,000	272	190	50
July	.....	.....	.....	29,350	.....	.....	160
August	4,000	2,040	.....	9,100	.....	.....	.....
September	6,000	2,000	.....	1,900	.....	.....	.....
October	.....	5,000	.....	33,100	.....	.....	.....
November	2,000	3,520	.....	27,300	640	105	100
December	.....	1,500	.....	8,900	.....	.....	113
January	.....	2,900	.....	8,950	.....	.....	375
February	2,300	2,256	.....	2,300	.....	.....	50
March	2,000	2,200	.....	40,550	1,008	.....	100
	20,350	28,076	200	249,910	3,080	347	1,048

* " First " Anthrax Vaccine only.

It is gratifying to know that the Biological Laboratory is almost entirely self-supporting. The staff consists of four veterinary pathologists, two laboratory helpers, a stenographer, and a caretaker. After deducting the salaries of the staff, and paying for the various instruments, chemicals, etc., required at the laboratory, the cost of running the latter for the year has been but $1,760 in excess of the revenue derived from the sale of biological products of the laboratory during the year.

But during the year fifty thousand doses, approximately, of tuberculin and mallein (as well as several hundred doses of abortion vaccine), manufactured at the laboratory, were given away by the department. These were used by the department's inspectors, in testing for tuberculosis and glanders the stock of farmers and stockmen throughout the country. The cost of manufacturing all this material is included in the cost of running the laboratory for the year, as above referred to. Had a charge, at current market rates, been made, a large revenue—far in excess of the cost of running the laboratory—would be shown to the credit of the laboratory for the year.

Owing to the increasing demand for these preparations, and the broadening scope of the work of the laboratory, it will be very necessary in the immediate future to provide better and more ample facilities for the manufacture of the products in question. Better facilities will, of necessity, also be required for research work. There are many obscure diseases of animals in Canada which should be studied, and our present buildings and equipment will require to be enlarged.

In addition to research work and the manufacture of biological products, the laboratory staff has rendered invaluable aid to the Field Veterinary Division, the Meat and Canned Foods Division, and to the farmers of Canada at large, through its examination of specimens submitted for diagnosis. Some eight hundred specimens were examined and reported upon by the laboratory during the year.

It is considered that the first and foremost function of the laboratory is to aid veterinarians in the study and diagnosis of animal diseases. The publications of the Biological Laboratory at Ottawa, and also of the laboratories at Lethbridge, Alta., and Agassiz, B.C., are nearly all of them of a technical nature. There are, however, a few publications, issued in the form of bulletins, available to the public and readily intelligible to the lay mind. In addition, a large number of the "studies" of diseases which have been published are to be found in the various scientific journals. The results of the research work of the laboratory in connection with animal diseases have in many instances been with little delay available to the farmer and stockman. On the other hand, of course, in many cases extended study and work, requiring the exercise of patience and perseverance, are necessary before a practical, final and satisfactory result can be obtained.

For example, we have definitely proved that the common bracken (*Pteris aquilina L.*) has caused, beyond doubt, the death of many horses on the Pacific coast. Our experiments have clearly shown the quantity of this poisonous plant which will produce the disease, known as bracken poisoning. Moreover, we have devised ways and means for the cure and the prevention of the affection.

Our experiments in connection with *Haematuria*, or red water, have also yielded very encouraging results, and we hope to give out ere long some precise information in regard to the control of this disease.

Swamp fever is being studied, both at Ottawa and Lethbridge; and it is gratifying to know that we are receiving the active co-operation of the officials of the Bureau of Animal Industry at Washington in this pursuit.

Our experiments in contagious abortion in cattle are continuing to meet with success. It is now proposed that our vaccine for contagious abortion in cattle should be supplied to veterinarians under the same regulations which govern the disbursement of tuberculin.

In addition to our experiments with bacterial and other diseases, the laboratory staff has taken up the study of parasites, especially of Warbles in cattle and Bots in horses. These parasites are the cause of much annoyance and injury to these animals.

The branch laboratories at Lethbridge and Agassiz are doing much good work in the study and eradication of local diseases in Alberta and British Columbia.

Owing to the absence of some of our pathologists, who are still doing military service in Europe, the work of the Biological Laboratory has had to be curtailed in some directions; but the necessary tests, especially for dourine in horses, have continued with gratifying results.

MEAT INSPECTION DIVISION.

The extremely heavy work referred to in my previous report has continued during the year ending on March 31, 1918. This has been due not only to the heavy demand for meat foods for the Allied Armies and the inhabitants of the European countries, but to the fact that a number of our younger men resigned in order that they might proceed overseas, and to the difficulty already existing of procuring a sufficient number of qualified veterinarians to carry on the work.

Owing to the steady advance of the cost of living, upon representations made to the Minister, the minimum and maximum salaries of our employees were increased, that for veterinary inspectors now being from $1,400 to $2,000 and for lay inspectors from $1,000 to $1,200 or, in particular cases, $1,400. This increase, while absolutely necessary, is at the same time very much appreciated by our staff.

During the year, Dr. Barnes, chief inspector, Meat and Canned Foods Act, visited all the establishments under inspection in Western Canada, going into the work in more or less detail in each establishment with a view to securing greater uniformity in the methods by which the work is carried on throughout the Dominion. Particular attention was paid to the necessity for sanitary construction and equipment, and from the reports received from our officers his visit has resulted in marked improvements along these lines.

Early in December the Canada Food Board, acting under the War Measures Act. procured an Order in Council permitting the use of oleomargarine in Canada. The administration of this measure, in so far as the importation and manufacture of the product was concerned, was entrusted to this branch. Considerable extra work was necessarily forced upon the staff, yet after a slight delay immediately following the passing of the order, licenses to import and to manufacture were issued. Some 404 applications were received from persons or firms desiring to become importers, but seventy-five per cent of these licenses were not used owing to the fact that there was an evident misunderstanding of the terms of the order. Many of those applying for permission to import were under the impression that a license was required for the retail sale of this product. At the end of the fiscal year there were only two firms engaged in the actual production of oleomargarine in this country. Although many others applied for licenses to manufacture, their requests were refused on the grounds that the premises in which they wished to operate did not conform to our requirements regarding sanitary conditions and equipment and that the volume of business to be carried on was not such as would warrant this department in the expenditure necessary to maintain inspection. The work involved in the control of oleomargarine, while new, has been well carried out and the requirements of the law have been satisfactorily observed. Special officers have visited the importers from time to time and have reported that the restrictions of the order are being obeyed.

The usual increases in salary were given at the beginning of the fiscal year.

The annual qualifying examinations for veterinarians were held by the department at various points throughout Canada on April 20, and at Laval University, Montreal, on May 18, 1917. Fifty candidates wrote on these examinations, of whom

26 were successful and 14 have been appointed to positions in the Meat Inspection Division. Owing to the difficulty in securing sufficient help from this source, owing in part to the number of these men who were required for military service, an arrangement was made with the Civil Service Commission whereby assistant veterinary and lay inspectors might be appointed temporarily upon condition of passing the required examination at the first opportunity. This arrangement worked very well indeed and assisted us materially during the past season.

I also wish to express my gratification at the manner in which the managements in charge of the different establishments have met our requirements in connection with new equipment and modern construction. The old wooden equipment, once so common in packing houses, is rapidly disappearing. This is very much appreciated, especially in view of the fact that metal of all kinds is more or less difficult to obtain and high in price.

The only establishment to go under permanent inspection during the year was that of Oxo, Limited, Montreal, which is officially known as No. 3.

From present indications, however, we may look forward to an early increase in the number of establishments, and in many of those already in operation there will be undoubtedly a considerable amount of overhauling and in several large additions will be made. A notable feature in connection with these additions and changes is the evident desire of the managements to use only the best plans and to have the construction conform to the latest scientific and sanitary ideas.

Violations of the Meat and Canned Foods Act necessitated legal action by the department three times during the past year. In the case of an illegal shipment of meat from Quebec to Nova Scotia the dealer concerned was fined $100 and costs, this being his second offence. A nominal fine of $25 and costs was imposed on a packing company under inspection because one of its employees had tampered with official government markings. Proceedings were also instituted against a railway company but withdrawn upon the agreement of the company to pay all costs and to suspend the employee who had been guilty of permitting the transportation of meats without a certificate.

The following statistics are respectfully submitted:—

(*a*) Total slaughter:—

Cattle—	739,085	Increase over 1916–17	90,226 head or 13·90%
Sheep—	336,897	Decrease under 1916–17	79,678 head or 19·12%
Swine—	2,129,682	Decrease under 1916–17	115,829 head or 5·16%

(*b*) The provinces show increases or decreases as follows:—

Province.	Cattle.		Sheep.		Swine.	
	Head.	Per cent.	Head.	Per cent.	Head.	Per cent.
Ontario	+36,615	12·16	− 8,424	5·03	−94,561	7·01
Quebec	−10,607	5·68	−33,381	26·42	−49,604	14·66
Manitoba	+34,230	48·08	−16,445	53·55	+ 6,896	3·61
Saskatchewan	+ 9,111	108·00	− 486	9·80	+ 4,635	13·85
Alberta	+16,100	25·43	−14,263	35·65	+34,568	13·08
British Columbia	+ 3,682	20·18	−10,004	48·81	−17,205	33·63
New Brunswick	− 36	9·47	+ 3,073	36·83	.....	.....
Nova Scotia	.....	.....	.....	.....	.....	.....
Prince Edward Island	+ 1,131	53·57	+ 252	13·84	− 558	3·20

(*c*) The percentage of slaughter for each province to the total for all Canada:—

Province.	Cattle.	Sheep.	Swine.
	Per cent.	Per cent.	Per cent.
Ontario	45·33	47·22	58·94
Quebec	23·84	27·60	13·56
Manitoba	14·27	4·23	9·30
Saskatchewan	2·37	1·33	1·80
Alberta	10·74	7·64	14·04
British Columbia	2·97	3·11	1·60
New Brunswick	0·04	3·39	....
Nova Scotia	....	....	....
Prince Edward Island	0·44	5·48	0·76

SLAUGHTERINGS.

Cattle.—Quebec and New Brunswick are the only provinces showing a decrease, the others all show increases.

Sheep.—New Brunswick and Prince Edward Island show an increase, while the other provinces show large decreases.

Swine.—The three Prairie Provinces are the only ones to show an increase in hogs, all the others being below last year.

Provincial percentage to total kill (see table *c*).

It is to be noted here that the four western provinces increased their percentage of slaughter of all animals killed, except Alberta in sheep and British Columbia in sheep and swine. Ontario increased its kill of sheep by 7 per cent, while cattle and swine are about the same as last year. Quebec is below last year in cattle, sheep and swine, 5, 2·75 and 1·50 per cent, respectively.

During the course of reinspection the following meats were condemned:—

——	Cattle.	Sheep.	Swine.	Poultry.
	lbs.	lbs.	lbs.	lbs.
Bruised	9·317	15	38,037	.....
Decomposed	108,458	1,349	76,312	.....
Dirty	307,173	1,525	140,910	.....
Sour	105,784	1,352	135,770	.....
Various	433	.....	644	1,131
Total	531,165	4,241	391,673	1,131

Total amount condemned on re-inspection, 928,210 pounds.

Customs statistics show that Canada imported and exported the following during the year:—

——	Imports.	Exports.
Cattle (live)	3,515	191,356
Sheep "	37,881	134,705
Swine "	.....	15,647
Beef, lbs	13,390,320	86,738,113
Mutton "	2,298,630	192,224
Pork "	84,889,787	222,759,571
Lard "	1,401,147	1,955,222
Canned meats, lbs	620,042	13,422,624

CARCASS CONDEMNATIONS.

Cattle.—The percentages of carcases condemned to total kill is much lower this year when compared with last year, 1·07 per cent against 1·68 per cent, while the percentage of those condemned for tuberculosis is very much higher namely, 58·42 per cent against 39·90 per cent last year, largely due to increased number of canners slaughtered.

Those condemned for bruises, cripples and imperfect bleeding are below last year, 3·22 per cent against 3·41 per cent.

Emaciated condemnations are below last year's, 1·80 per cent against 5·61 per cent.

Condemnations for *Cysticercus bovis* are 2·64 per cent against 2·37 per cent last year.

Immaturity condemnations are 22·41 per cent against 37·75 per cent last year.

The proportion of calves to total slaughter is 14·09 per cent against 14·83 per cent last year.

Sheep.—Sheep condemned to total kill is 0·13 per cent against 0·12 per cent last year.

Swine.—The number condemned this year is, on a percentage basis the same as last year, 0·27 per cent. This is satisfactory in itself. The percentage condemned for tuberculosis of this total is much higher than last year, namely 75·25 per cent against 62·22 per cent.

Cysticerous cellulosæ accounts for 5·81 per cent condemned against 8·10 last year. It is gratifying to find that only 6 carcases were condemned this year for hog cholera.

In comparing our reports, it is satisfactory to find that although we exported rather more cattle than a year ago, the proportion of young cattle (1 year or less) is much lower, 23·68 per cent against 33·0 per cent last year, the total number of cattle exported in 1916-17 being 166,236, this year 191,356.

Our live sheep exported being 134,705 against 59,340 last year, the percentage of 1 year and less being 84·65 per cent and 73·0 per cent respectively.

The exports of meats are all higher than a year ago although we did not import nearly as much as last year especially in pork.

It is regrettable that our hog killings have decreased again this year but it is to be hoped from the measures taken in November and December, 1917, that a large increase of swine will be the result in September, 1918. With the continued high prices there should be no doubt about raising hogs, anyway it should be a patriotic duty even at a loss.

Below you will find a comparison between hog killings of Canada, Denmark, and Ireland for the calendar years:—

HOG KILLINGS.

Year (January to December).	Canada.	Denmark.	Ireland.
1912	1,650,966	2,084,786	1,416,490
1913	1,564,246	2,215,850	1,181,285
1914	2,255,479	2,654,041	1,266,620
1915	2,616,461	1,960,965	1,376,063
1916	2,313,389	1,534,011	1,277,900
1917	2,086,009	*1,000,000	967,475

*Estimated.

The following summary shows the result of post mortem inspections of cattle, sheep, and swine, from April 1, 1917, to March 31, 1918:—

Cattle marked "Canada Approved"	731,160
Carcases of cattle "Condemned"	7,925
Percentage of cattle "Condemned"	1·07
Portions of cattle "Condemned"	237,212
Sheep marked "Canada Approved"	336,461
Carcases of sheep "Condemned"	436
Percentage of sheep "Condemned"	0·13
Portions of sheep "Condemned"	90,332
Swine marked "Canada Approved"	2,123,895
Carcases of swine "Condemned"	5,787
Percentage of swine "Condemned"	0·27
Portions of swine "Condemned"	936,040
Total number of carcases "Passed"	3,191,516
Total number of carcases "Condemned"	14,148
Percentage of carcases "Condemned"	0·44
Total number of portions "Condemned"	1,263,584

In addition to the animals slaughtered at inspected establishments, the following amounts of dressed and cured meats and lard, etc., were received during the fiscal year from foreign countries:—

	Pounds.
Beef	14,629,444
Mutton	368,566
Pork	84,362,851
Lard	1,320,858

DISEASES FOUND AT ESTABLISHMENTS UNDER INSPECTION.

Diseases.	Cattle.			Sheep.			Swine.			Poultry.
	Carcases.	Portions.	Lb.	Carcases.	Portions.	Lb.	Carcases.	Portions.	Lb.	Lb.
Abscess	7	38,548		3	246		7	5,847		
Actinomycosis	54	41,309					2	2,441		
Adhesions		11,579			384			15,121		
Arthritis	3	5		2	17		49	253		
Angiomatosis		1,643								
Bruises	96	88,418	9,317	19	1,147	15	22	19,884	38,037	
Cripples	12	300		5	39		3	7,785		
Cysts		1,318			58			7,160		
Cysticercus Bovis	209	2,743								
" Cellulosæ							394	133		
" Ovis	1			4	158					
" Tenuicollis				1	121					
Congestion	1	25			764			507		
Cirrhosis		41						1,015		
Decomposed			108,458	1		1,349			76,312	
Dirty		764	307,173		40	1,525		972	140,910	
Emaciation	142			167			28			
Enteritis	16			2			41			
Emphysema	2	1					6	193		
Hernia		2			2			100		
Hydræmia	89			38			4			
Hog Cholera							6			
Immaturity	1,776						3			
Improper Bleeding	147			53			70			
Inflammation	3						40			
Icterus	9			7			20			
Induration		1						195		
Metritis	32			7			14			
Mucoid Degeneration	213									
Melanosis	5	12					2	1		
Necrosis	2	129			2,574			7,950		
Nephritis	11			2			9			
Parasites		12,285			84,759		1	88,648		
Pericarditis	48			3			7			
Peritonitis	34			14			89			
Pleuritis	20			5			75			
Pneumonia	78			65			131			
Pyemia or Septicæmia	194			21			315			

Sexual Smell	1	...	...	...	...	...	23	1,156	...	...
Skin Disease	...	1	...	...	...	...	2	1,339	...	...
Sarcoma	7	...	...	1	...	...	4	...	...	...
Sour	...	...	105,784	...	...	1,352	...	...	135,770	...
Septic Infection	27	...	...	...	...	...	...	...	...	...
Tuberculosis	4,630	36,478	...	3	7	...	4,355	772,236	...	...
Tumours	14	15	...	...	...	...	10	12	...	...
Uræmia	...	...	...	...	...	...	2	...	...	...
Various	42	1,601	433	13	16	...	53	3,092	644	...
Total	7,925	237,218	531,165	436	90,332	4,241	5,787	936,040	391,673	1,131 & 179 carcases.
Found dead	386	...	...	291	...	...	1,978	...	...	...

FRUIT AND VEGETABLES.

The campaign for increased production and the conservation of food products created a lively interest in the best methods of dealing with the surplus of our fruits and vegetables. The regular factories engaged in this trade were offered all the raw material that they could handle; "Community Centre" canning factories were established; Farmers' Clubs, Red Cross, and other patriotic organizations took up this work in earnest, with the result that a larger quantity of fruit and vegetables than was ever previously taken care of in Canada was prepared for consumption during the period of the year when it was impossible to obtain this class of food in its natural state. Vast quantities were shipped overseas, not particularly to enter the trade but for the use of the Allied armies. Yet, with the high cost of labour, tin, and all material used in connection with this business, the increased pack did not lower the price to the consumer.

The quality of the product packed showed an improvement over previous years, and the sanitary condition of the establishments in operation is advancing steadily, yet much remains to be done along this line. It is hoped that at the close of the war, when prices again become normal, much of the old unsanitary wooden equipment may be dispensed with.

The insistence by the British Ministry of Food in connection with all their contracts that the contents of the cans be truthfully described has more than ever convinced me that immediate action must be taken to see that the consumer can by the label reasonably satisfy himself as to the quality of the contents. Until this is done the suspicion which at the present time exists in the minds of many Canadians regarding the quality of canned products will continue. This is indeed unfortunate, and I trust that those engaged in this industry will co-operate with the department in an insistence upon and faithful observance of the requirements regarding a true and correct description. If this is done and the managements of establishments are more careful than they have been in the past to protect their different brands, it will be but a short time until a confidence is established which will result in an increased demand for this class of food. This demand the department is ready to encourage and foster, yet it will be readily understood that if any results are to be achieved the manufacturer himself must lend his assistance.

The Canada Food Board in the administration of its work requested the co-operation of this branch, in consequence of which Mr. C. S. McGillivray, chief travelling inspector, canned fruits and vegetables, was permitted to place part of his time at the disposal of the board. This arrangement has proved to be very satisfactory to the board and to the establishments engaged in the manufacture of this class of products. His practical knowledge of the industry was of material assistance in dealing with the many complex problems which confronted the Food Control administration during the past year.

EVAPORATED AND CONDENSED MILK.

Little criticism can be offered in connection with this class of trade. The plants, almost without exception, are of sanitary construction and equipment, the business being one in which sanitation is essential, otherwise great difficulty would be experienced in the keeping quality of the product.

The establishments have been extremely busy, large orders having been received from the Ministry of Food for this product, which was shipped to the Allied armies. Owing to the tremendous shortage of dairy cattle in Continental Europe on account of the war, I have no doubt that a steady and profitable foreign trade can be maintained by Canada.

Tests are being regularly made of the Canadian product to determine its compliance with the standard, and while in some cases variations have occurred, I am satisfied that the managements are making an earnest effort to conform to the law and to place upon the market a product which meets our requirements.

REPORT

OF THE

DOMINION EXPERIMENTAL FARMS

FOR THE

FISCAL YEAR ENDING MARCH 31, 1918

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1918

[No. 16.—1919.]

DOMINION EXPERIMENTAL FARMS.

J. H. GRISDALE, B. Agr., Director.

PERSONNEL.

Central Experimental Farm, Ottawa, Ont.—

Dominion Chemist.. .. .. F. T. Shutt, M.A., D.Sc.
Assistant Dominion Field Husbandman.. .. .. W. L. Graham, B.S.A.
Dominion Animal Husbandman.. .. .. E. S. Archibald, B.A., B.S.A.
Dominion Horticulturist.. .. .. W. T. Macoun.
Dominion Cerealist.. .. .. C. E. Saunders, Ph.D.
Dominion Botanist.. .. .. J. H. Grisdale, B.Agr. (Acting).
Apiarist.. .. .. F. W. L. Sladen.
Dominion Agrostologist.. .. .. M. O. Malte, Ph.D.
Dominion Poultry Husbandman.. .. .. F. C. Elford.
Chief Officer, Tobacco Division.. .. .. F. Charlan.
Chief Officer, Division of Economic Fibre Production.. R. J. Hutchinson.
Supervisor, Division of Illustration Stations.. .. .. .. J. Fixter.
Officer in Charge, Division of Extension and Publicity.. W. A. Lang.

Branch Farms and Stations—

Superintendent, Experimental Station, Charlottetown, P.E.I.. .. .. J. A. Clark, B.S.A.
Superintendent, Experimental Station, Kentville, N.S. .. W. S. Blair.
Superintendent, Experimental Farm, Nappan, N.S.. .. W. W. Baird, B.S.A.
Superintendent, Experimental Station. Fredericton, N.B. W. W. Hubbard.
Superintendent, Experimental Station, Ste. Anne de la Pocatière, Que.. .. .. J. Begin.
Superintendent, Experimental Station, Cap Rouge. Que. G. A. Langelier.
Superintendent, Experimental Station, Lennoxville, Que. J. A. McClary.
Foreman-Manager, Experimental Station, Spirit Lake, Que.. .. .. P. Fortier.
Foreman-Manager, Experimental Station, Kapuskasing, Ont.. .. .. S. Ballantyne.
Acting Superintendent, Experimental Station, Morden, Man... .. .. E. M. Straight.
Superintendent, Experimental Farm, Brandon, Man.. .. W. C. McKillican, B.S.A.
Superintendent, Experimental Farm, Indian Head, Sask. W. H. Gibson, B.S.A.
Superintendent, Experimental Station, Rosthern, Sask. .. W. A. Munro, B.A., B.S.A.
Acting Superintendent, Experimental Station, Scott, Sask.. .. .. M. J. Tinline, B.S.A.
Superintendent, Experimental Station, Lethbridge, Alta. W. H. Fairfield, M.S.
Superintendent, Experimental Station, Lacombe, Alta.. G. H. Hutton, B.S.A.
Superintendent, Experimental Station, Summerland, B.C. R. H. Helmer.
Superintendent, Experimental Station, Invermere, B.C.. G. E. Parham.
Officer in Charge, Experimental Farm, Agassiz, B.C. .. W. H. Hicks, B.S.A.
Superintendent, Experimental Station, Sidney, B.C.. .. L. Stevenson, B.S.A., M.S.

OTTAWA, March 31, 1918.

SIR,—I have the honour to submit herewith, for your approval, the thirty-first annual report of the work carried on at the Dominion Experimental Farms, Stations, and Substations.

Following out the plan incepted last year, this report gives merely a brief review of the year's progress in the various lines of work under way. The complementary part of the plan, namely, the publication of our detailed results when a certain line of experiment is complete, has already been put into action by the issuing of a number of useful publications during the past year, and it is hoped to add to these during the coming twelvemonth.

I have the honour to be, sir,
Your obedient servant,

J. H. GRISDALE,
Director, Dominion Experimental Farms.

To the Honourable
The Minister of Agriculture,
Ottawa.

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ANNUAL REPORT OF THE EXPERIMENTAL FARMS

FOR THE YEAR ENDING MARCH 31, 1918

REPORT OF THE DIRECTOR

J. H. GRISDALE, B. Agr.

FIELD CROP AND LIVE-STOCK NOTES FOR 1917.

The spring of 1917 was backward, and consequently seeding, practically all over the Dominion, was delayed to such an extent that the grain acreage was much less than usual, and a correspondingly larger acreage was devoted to later-sown crops.

Severe frosts in May and continued dry weather until just before harvest caused the grain yield in the Prairie Provinces to be lower than usual, but the diminution in yield was offset by increased prices, while the crop in general graded high.

The season in the Maritime Provinces and Quebec was a poor one, but in Ontario general conditions were excellent, and the season was one of the best on record.

The total value of Canada's field crops for the year was $1,144,636,456, this being the first time in Canada's history that the value of her field crops has exceeded a billion dollars. This is an increase of more than a quarter of a million dollars over the figures for 1916.

The area under root and fodder crops was greater than in 1916. Although the yield of potatoes per acre was the lowest on record, a greatly increased acreage, together with higher prices, caused the total value of this crop to be nearly $30,000,000 greater than the previous year.

In the following tables details are given of the yields and values of the principal field crops for 1916 and 1917.

In table 3 the numbers of the various classes of live stock in Canada are given for the period of 1913-17.

COMPARISON of Yields and Prices obtained for the Years 1916 and 1917.

Crop.	Average Yield per Acre.		Average Price per Bushel.		Total Production.	
	1916	1917	1916	1917	1916	1917
	bush.	bush.	$	$	bush.	bush.
Fall wheat	21·50	21·50	1 54	2 08	17,590,000	15,533,450
Spring wheat	16·85	15·50	1 29	1 93	245,191,000	218,209 400
All wheat	17·10	15·75	1 31	1 94	262,781,000	233,742,850
Oats	37·30	30·25	0 51	0 69	410,211,000	403,009,800
Barley	23·72	23·00	0 82	1 08	42,770,000	55,057,750
Rye	19·38	18·25	1 11	1 62	2,876,400	3,857,200
Peas	14·50	15·25	2 22	3 54	2,218,100	3,026,340
Beans	12·70	13·75	5 40	7 45	412,600	1,274,000
Buckwheat	17·50	18·00	1 07	1 46	5,976,000	7,149,400
Mixed grains	25·75	32·50	0 88	1 16	10,584,800	16,157,080
Flax	12·56	6·50	2 04	2 65	8,259,800	5,934,900
Corn for husking	36·25	33·00	1·07	1 84	6,282,000	7,762,700
Potatoes	133·82	121·50	0 81	1 01	63,297,000	79,892,000
Turnips, Mangels, etc	264·24	290·75	0 39	0 46	36,921,100	63,451,000
	tons	tons	per ton	per ton	tons	tons
Hay and Clover	1·86	1·66	11 60	10 33	14,527,000	13,684,700
Fodder corn	6·65	7·34	4 92	5 14	1,907,800	2,690,370
Sugar beets	4·75	8·40	6 20	6 75	71,000	117,600
Alfalfa	2·91	2·39	10 69	11 59	286,750	262,400

TABLE 2.—Comparison of Eastern Canada, Prairie Provinces, and British Columbia as to Yields and Prices obtained.

	Eastern Provinces.				Prairie Provinces				British Columbia			
	Average Yield per acre		Average Price Obtained		Average Yield per acre		Average Price Obtained		Average Yield per acre		Average Price Obtained	
	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917
			$	$			$	$			$	$
Fall wheat	21·25	21·50	1 55	2 09	25·06	20·07	1 40	2 00	30·75	31·75	1 53	1 92
Spring wheat	16·23	18·93	1 71	2 17	16·85	15·54	1 29	1 91	31·00	28·50	1 54	2 00
Oats	25·90	30·87	0 68	0 78	42·65	29·78	0 46	0 63	60·50	53·75	0 64	0 90
Barley	22·56	27·04	1 01	1 25	24·02	21·83	0 77	1 02	45·75	29·25	0 83	1 28
Peas	14·23	15·11	2 23	3 56	28·88	17·34	2 25	3 16	33·75	23·75	1 67	2 46
Rye	17·15	17·49	1 19	1 68	21·83	18·74	1 04	1 59				
Flax	9·46	10·21	2 75	3 54	12·58	6·41	2 04	2 63				
Potatoes	124·73	116·70	0 90	1 09	155·38	132·86	0 53	0 80	189·00	166·55	0 70	0 69
Turnips, etc	256·14	303·50	0 37	0 43	207·70	181·70	0 56	0 80	500·00	344·58	0 50	0 64
	tons	tons			tons	tons			tons	tons		
Hay and clover	1·83	1·69	11 56	10 15	1·94	1·42	8 10	10 68	2·67	1·85	17·75	17 60
Sugar beets	4·75	8·40	6 20	6 75								
Fodder corn	6·67	7·74	4 91	5 00	2·71	2·82	5 14	7 66	10·00	7·00	7 00	15 00
Alfalfa	2·99	2·77	9 75	9 98	2·69	1·96	10·83	11·47	2·88	2·58	15·00	22 92

TABLE 3.—Farm Live Stock, 1913-17.

	1913	1914	1915	1916	1917
Eastern Provinces:—					
Horses	1,436,207	1,441,381	1,442,063	1,396,760	1,434,832
Milch cows	2,188,824	2,097,586	2,075,750	1,998,318	2,270,837
Other cattle	2,479,406	1,904,976	1,848,504	1,727,773	2,103,329
Sheep	1,747,108	1,630,714	1,569,488	1,483,065	1,840,054
Swine	2,491,564	2,357,128	2,269,029	2,036,832	2,102,506
Western Provinces:—					
Horses	1,369,283	1,445,652	1,492,681	1,800,270	1,922,793
Milch cows	516,011	539,998	553,152	792,797	882,441
Other cattle	1,336,098	1,359,464	1,450,212	1,929,844	2,423,990
Sheep	336,423	382,331	420,770	493,607	485,446
Swine	922,221	1,038,102	804,328	1,340,179	1,479,188
British Columbia:—					
Horses	60,518	60,705	61,355	61,312	55,124
Milch cows	35,599	35,702	37,944	39,318	49,005
Other cattle	100,183	99,091	100,439	103,101	191,338
Sheep	45,000	45,000	46,494	46,269	43,858
Swine	34,541	39,031	38,543	37,829	37,688

TABLE of Meteorological Observations taken at the Central Experimental Farm, Ottawa, from April 1, 1917, to March 31, 1918; giving maximum, minimum, and mean temperature for each month and date of occurrence; also the rainfall, snowfall, and total precipitation.

Month.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	No. of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		Ins.	Ins.	Ins.		Ins.	
April	47·32	31·46	15·87	39·39	66·0	21	16·0	9	2·38	4·00	2·78	12	0·59	6
May	58·62	38·95	19·66	48·78	81·0	31	30·0	15	1·83	.....	1·83	11	0·63	23
June	73·47	53·04	20·43	63·25	85·1	13	36·8	6	2·58	.....	2·58	15	0·92	11
July	80·85	60·37	20·47	70·60	97·7	30	50·0	3	2·87	.....	2·87	18	0·95	10
August	78·45	57·28	21·16	67·86	99·6	1	46·0	31	3·40	.....	3·40	15	1·16	16
September	68·03	45·16	22·87	56·59	80·9	19	31·6	23	1·20	.....	1·20	11	0·64	30
October	49·11	35·69	13·42	42·40	61·6	19	24·9	21	5·17	.....	5·17	18	0·92	25
November	34·96	21·19	13·76	28·07	50·0	9	− 8·0	27	0·35	10·50	1·40	7	0·55	23
December	15·09	− 1·36	16·39	6·83	37·8	1	−30·8	30	0·26	27·00	2·96	14	1·00	9
January	12·10	− 2·20	14·31	4·95	27·0	12	−21·4	28	.....	31·50	3·14	15	1·30	12
February	19·92	− 1·76	21·68	9·08	41·4	20	−28·2	6	0·86	23·75	3·23	13	0·80	9
March	34·14	16·40	17·74	25·27	51·6	31	− 6·0	11	.....	19·25	1·92	11	0·70	10
									20·90	116·00	32·48	160		

Rain or snow fell on 160 days during the 12 months.
Heaviest rainfall in 24 hours, 1·16 inch on August 16.
Heaviest snowfall in 24 hours, 13·00 inches on January 12.
The highest temperature during the 12 months was 99·6° on August 1.
The lowest temperature during the 12 months was 30·8° on December 30.
During the growing season rain fell on 12 days in April, 11 days in May, 15 days in June, 18 days in July, 15 days in August, and 11 days in September.
November shows the lowest numbers of days with precipitation, viz., 7.
Total precipitation during the 12 months 32·48 inches, as compared with 37·18 inches during 1916-17.

RAINFALL, Snowfall, and Total Precipitation from 1890 to 1917-18; also the average annual amount that has fallen.

	Rainfall.	Snowfall.	Total precipitation
1890	24·73	64·85	31·22
1891	30·19	73·50	37·54
1892	23·78	105·00	34·28
1893	31·79	72·50	39·04
1894	23·05	71·50	30·20
1895	27·01	87·50	35·76
1896	21·53	99·75	31·50
1897	24·18	89·00	33·08
1898	24·75	112·25	35·97
1899	33·86	77·25	41·63
1900	29·48	108·00	40·72
1901	29·21	97·25	38·91
1902	25·94	101·75	36·10
1903	26·43	85·00	34·92
1904	25·95	108·75	36·79
1905	23·71	87·25	32·42
1906, January 1 to March 31	1·90	24·50	4·34
1906–07	21·73	72·50	28·94
1907–08	24·70	134·75	38·18
1908–09	22·13	107·90	32·91
1909–10	28·40	61·25	34·51
1910–11	18·94	88·25	27·72
1911–12	20·12	98·50	29·95
1912–13	32·54	106·50	43·18
1913–14	21·51	70·25	28·51
1914–15	16·77	78·50	24·67
1915–16	22·66	130·00	35·65
1916–17	24·84	126·50	37·18
1917–18	20·90	116·00	32·48
Total for 28 years and 3 months	702·73	2,656·50	968·30
Average for 28 years	25·09	94·87	34·58

RECORD of Sunshine at the Central Experimental Farm, Ottawa, from April 1, 1917, to March 31, 1918.

Months.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
April	22	8	179·2	5·97
May	27	4	199·9	6·44
June	28	2	222·6	7·42
July	28	3	247·5	7·98
August	31	0	241·0	7·77
September	26	4	205·3	6·84
October	23	8	91·6	2·95
November	24	6	121·1	4·03
December	23	8	127·6	4·11
January	23	8	128·7	4·15
February	19	9	99·0	3·53
March	30	1	210·6	6·79

DISTRIBUTION OF SAMPLES.

The distribution of samples of seed grain, potatoes, flower seeds, fruit trees, and shrubs was again carried on during the past winter from the Central Farm at Ottawa and from the various branch Farms and Stations. The usual distribution of seed

grain was made from Ottawa, and from the branch Farms and Stations 3,680 samples of seed grain, 6,174 samples of potatoes, 1,912 samples of flower seeds, 5,198 samples of fruit trees and 386 samples of other trees and shrubs were sent out.

Some special distributions were also made, such as tobacco seed from the Central Farm; trees, shrubs, and tree seeds from the Farms in Saskatchewan; corn and vegetable seeds from the Quebec Stations; strawberry plants from Nappan, etc.

ENLISTMENTS.

Below are recorded the enlistments from the Experimental Farms Branch from April 1, 1917, to March 31, 1918: S. A. Bjarnason, J. Butler, H. Cannon, J. S. Chivers, P. Christopher, S. Cole, R. Cornish, W. H. Davies, W. I. Dutton, W. Fahey, A. Gallant, A. George, V. Gregory, Avelin Morley, and N. Pineau.

EXPERIMENTS AT FORT VERMILION, ALTA.

CHARACTER OF SEASON.

The first warm spring days occurred between April 12 and 22, and the snow disappeared rapidly, leaving the ground quite bare and exposed to the cold weather which followed. During this cold spell much damage was done to the alfalfa and to the shrubs and trees.

May continued cold until the middle of the month. Seeding started at the Station on the 7th, some days later than usual, and was general in the district by the 10th. Frost was recorded on twenty-one nights in May, but germination of seed was prompt, due to warm days and abundant moisture in the soil.

Growth was fair during June, although a frost on the first nipped the vegetable garden.

July and August were good growing months, with abundant rainfall. Prelude wheat was cut on the 13th, Daubeney oats on the 8th, and barley on the 13th of the latter month.

Dry weather during October has reduced the area of fall ploughing expected.

Cereals.—Six varieties of wheat tested ranged in yield from Marquis, 69 bushels per acre, to Prelude, 48 bushels 30 pounds. Seven sorts of oats yielded from 155 bushels 10 pounds for Garton's Regenerated Abundance to 81 bushels 6 pounds for Eighty-Day. Five varieties of barley varied in yield from 61 bushels 2 pounds from Success to 96 bushels 2 pounds from Canadian Thorpe. Spring rye yielded 60 bushels per acre, and fall rye 44 bushels. Two varieties of peas were tested, the Arthur giving a return of 47 bushels 32 pounds per acre and Prussian Blue 45 bushels 22 pounds. A plot of Premost flax yielded 31 bushels 4 pounds of seed and 1 ton 1,720 pounds of straw per acre.

Forage Crops.—The plots of alfalfa were badly winter-killed, and were ploughed up. Fresh seedings will be made.

Meadow fescue gave a yield of 2 tons 1,600 pounds hay per acre, and a plot grown for seed yielded 480 pounds per acre. Brome grass yielded 2 tons 1,500 pounds, timothy 2 tons 200 pounds, red top 2 tons 75 pounds, and rye grass 2 tons 1,200 pounds per acre. Three plots of millet yielded at the rates of 8 tons 350 pounds, 5 tons 470 pounds, and 5 tons 980 pounds per acre, respectively.

Three varieties of Indian corn were grown for fodder, Longfellow, Canada Yellow, and Quebec Yellow. The weights (green) for each were 28 tons 440 pounds, 20 tons 420 pounds, and 25 tons 290 pounds, respectively. Considering the late and cold spring, the corn made remarkable growth.

Four varieties of field carrots, four of mangels and six of field turnips were grown. Improved Short White gave the heaviest yield of carrots, 23 tons 1,580 pounds per acre; Selected Yellow Globe, among the mangels, with 24 tons 300 pounds; and Good Luck, among the turnips, 21 tons 660 pounds.

Two varieties of sugar beets, Vilmorin Improved and Klein Wanzleben gave a yield of 18 tons 480 pounds and 16 tons 1,360 pounds per acre, respectively.

In vegetables the following sorts were grown: Sweet or garden corn, two varieties matured sufficiently for table use, namely, Sioux Squaw and White Squaw; lettuce, radish, table carrots, table beets, parsnips, onions, table turnips, garden peas, beans, parsley, asparagus, rhubarb, cabbage, cauliflower, celery, pumpkins, cucumbers, squash, and tomatoes. These all did well, although the yield was lessened by drought in June.

The first sowing in the vegetable garden was on May 7, and in the hotbeds on April 25. Transplanting began May 22, except celery, which was kept in the beds until June 15.

Six varieties of potatoes were planted May 9 and 10, on well-prepared land. Rochester Rose gave the highest yield, 505 bushels 40 pounds per acre; and Irish Cobbler the lowest, 325 bushels 40 pounds.

All flowers, both annuals and perennials, made excellent growth and were greatly admired by visitors and added much to the attractiveness of the Station, which is in full view of the river and is usually visited by the passengers upon the arrival of the steamer.

TABLE of Meteorological Observations, taken at Fort Vermilion, Peace River District, Alberta, from April 1, 1917, to March 31, 1918, showing maximum, minimum, and mean temperature, the highest and lowest for each month, with date of occurrence, also, rainfall, snowfall, and total precipitation.

Months.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°							
April	42·25	10·89	31·36	26·57	57·9	14	−21·0	1	0·50	.....	0·50	1	0·50	8
May	58·98	29·31	29·66	44·14	80·2	10	11·0	2	0·41	.....	0·41	2	0·25	15
June	64·96	35·88	29·07	50·41	78·0	26	19·9	1	1·84	.....	1·84	5	1·12	3
July	74·15	43·21	30·93	58·67	88·5	4	33·2	9	2·15	.....	2·15	7	0·92	30
August	70·48	39·59	30·88	55·03	82·0	12	28·5	27	1·33	.....	1·33	10	0·76	2
September	64·24	25·99	38·25	45·11	84·0	22	13·9	26	0·14	.....	0·14	2	0·10	6
October	40·28	16·68	23·59	28·47	62·0	9	−12·0	28	0·82	2·00	1·01	7	0·40	2
November	35·28	9·27	26·01	22·27	60·0	3	−14·9	30	....	1·50	0·15	1	0·15	25
December	−19·26	−37·49	18·22	−28·38	−4·0	5	−64·0	27	....	6·75	0·66	6	0·15	31
January	−3·50	−26·64	23·14	−15·07	13·0	7	−65·0	25	....	11·25	1·12	8	0·27	23
February	1·21	−26·26	27·12	−12·70	41·0	23	−65·8	19	....	7·25	0·71	8	0·15	9
March	16·92	−16·16	33·08	0·38	44·0	31	−48·0	4	....	4·25	0·42	5	0·15	7
									7·19	33·00	10·44	62		

SOME Weather Observations taken at Central Experimental Farm, Ottawa, as compared with those taken at Fort Vermilion, Peace River District, Alberta.

—	Mean Temperature.	Highest Temperature.	Lowest Temperature.	Total Precipitation.	Heaviest in 24 hours.	Total hours sunshine.	Average sunshine per day.
April.	°	°	°				
Ottawa	39·39	66·0	16·0	2·78	0·59	179·2	5·97
Fort Vermilion	26·57	57·9	−21·0	0·50	0·50	286·6	9·55
May.							
Ottawa	48·78	81·0	30·0	1·83	0·63	499·9	6·44
Fort Vermilion	44·14	80·2	11·0	0·41	0·25	296·3	9·55
June.							
Ottawa	63·25	85·1	36·8	2·58	0·92	222·6	7·42
Fort Vermilion	50·41	78·0	19·9	1·84	1·12	280·9	9·36
July.							
Ottawa	70·60	97·7	50·0	2·87	0·95	247·5	7·98
Fort Vermilion	58·67	88·5	33·2	2·15	0·92	297·7	9·60
August.							
Ottawa	67·86	99·6	46·0	3·40	1·16	241·0	7·77
Fort Vermilion	55·03	82·0	28·5	1·33	0·76	305·9	9·86
September.							
Ottawa	56·59	80·9	31·6	1·20	0·64	205·3	6·84
Fort Vermilion	45·11	84·0	13·9	0·14	0·10	244·8	8·16
October.							
Ottawa	42·40	61·6	24·9	5·17	0·92	91·6	2·95
Fort Vermilion	28·47	62·0	−12·0	1·01	0·40	128·1	4·13
November.							
Ottawa	28·07	50·0	−8·0	1·40	0·55	121·1	4·03
Fort Vermilion	22·27	60·0	−14·9	0·15	0·15	81·4	2·71
December.							
Ottawa	6·83	37·8	−30·8	2·96	1·00	127·6	4·11
Fort Vermilion	−28·38	−4·0	−64·0	0·66	0·15	80·8	2·60
January.							
Ottawa	4·95	27·0	−21·4	3·14	1·30	128·7	4·15
Fort Vermilion	−15·07	13·0	−65·0	1·12	0·27	72·0	2·32
February.							
Ottawa	9·08	41·4	−28·2	3·23	0·80	99·0	3·53
Fort Vermilion	−12·70	41·0	−65·8	0·71	0·15	94·8	3·38
March.							
Ottawa	25·27	51·6	−6·0	1·92	0·70	210·6	6·79
Fort Vermilion	0·38	44·0	−48·0	0·42	0·15	166·1	5·35

RECORD of Sunshine at Fort Vermilion, Peace River District, Alberta, from April 1, 1917, to March 31, 1918.

Months.	Number of days with sunshine.	Number of days without sunshine.	Total hours sunshine.	Average sunshine per day.
April	28	2	286·6	9·55
May	30	1	296·3	9·55
June	26	4	280·9	9·36
July	29	2	297·7	9·60
August	30	1	305·9	9·86
September	30	0	244·8	8·16
October	23	8	128·1	4·13
November	22	8	81·4	2·71
December	20	11	80·8	2·60
January	16	15	72·0	2·32
February	18	10	94·8	3·38
March	28	3	166·1	5·35

EXPERIMENTS AT GROUARD, ALTA.

The spring was late in opening. May and the first half of June were cold, retarding germination and growth. The latter half of June and the early part of the month of July were very hot, however, with good rainfall, so that growth was rapid. Unfortunately a drought followed, and on July 22 a severe hailstorm visited Grouard and did much damage to the crops. The weather during the rest of the season was ideal for growth and harvesting operations.

Three varieties of wheat, three of oats, two of barley, one of peas, and one of fall rye were grown. The yields of all were much lessened by the hailstorm referred to.

The vegetable garden suffered from the late spring, the drought of July, and the hailstorm. Beets, cabbage, carrots, celery, cauliflower, lettuce, onions, parsnips, radish, and turnips did well. Table corn has not yet succeeded at Grouard. Squash, cucumbers, and melons also failed, partly on account of damage from hail. Some tomatoes were picked and ripened in the house.

In field roots, mangels and turnips did only fairly well; the stand was uneven, and the turnips suffered from the white grub. Carrots gave a good yield.

Indian corn, of which three varieties were tried, was not a success. It will be tried further, however, before a decision is formed as to its possibilities in this region.

Western rye grass, red top, timothy, awnless brome, alfalfa, red clover, and alsike, all sown with oats as a nurse crop, made a good catch and went into winter in good condition.

EXPERIMENTS AT BEAVERLODGE, ALTA.

Speaking generally, the season at this point was a favourable one, and excellent results were obtained from the experimental work in cereals, forage plants, and vegetables. Late in August there was some damage from frost to wheat roots in the district, although these crops on the Station were not noticeably affected. Field peas, however, were seriously injured.

Of three varieties of wheat, Huron yielded the highest, 24 bushels 50 pounds per acre, and Prelude the lowest, 18 bushels 20 pounds. Four varieties of oats varied in yield from 80 bushels 30 pounds for Victory to 68 bushels 13 pounds for Abundance. Three varieties of barley were tested, the highest, O.A.C. No. 21, yielding 39 bushels 23 pounds, and the lowest, Early Chevalier, 35 bushels 10 pounds.

In forage plants, alfalfa has withstood two out of three winters well and only partially winter-killed during the severe winter of 1915-16. Red clover has stood one winter perfectly, one fairly well, but winter-killed completely in 1915-16. In 1917, abundant rainfall during late May and early June resulted in a good hay harvest; the yields were as follows: Western rye grass, 3 tons 1,838 pounds per acre; timothy, 2 tons 603 pounds; meadow fescue, 2 tons 650 pounds; red clover, 1 ton 1,720 pounds; alsike, 2 tons 743 pounds; and alfalfa, 2 tons 789 pounds.

In field roots, four varieties of turnips ranged in yield from 13 tons 1,364 pounds for Magnum Bonum to 11 tons 897 pounds for Bronze Top. Mangels (four varieties) varied from 8 tons 1,312 pounds for Giant Yellow Intermediate to 5 tons 1,727 pounds for Giant Half Sugar White. Two varieties of carrot, Ontario Champion and White Belgian, gave yields of 6 tons 1,822 pounds and 5 tons 52 pounds, respectively.

In horticulture, the excessive rainfall early in the season was unfavourable, but thorough cultivation later overcame this setback, and satisfactory yields of vegetables of good quality were, in most cases, obtained. Squash, garden peas, beets and turnips, lettuce, radish, parsley, cauliflower, parsnips and carrots all did well. Some experiments as to best dates of sowing were conducted, and will be repeated for a series of years.

Most of the apple trees planted out are making good growth. The currant bushes have grown well, and some varieties have fruited lightly. The raspberries and gooseberries have made good growth, but have not yet fruited. Strawberry plants, although set out under favourable conditions as soon as received, did not survive.

A number of varieties of ornamental trees and shrubs have made fair to good growth.

In July, 1917, arrangements were made to carry on more extensive experiments at Beaverlodge on a larger area. Considerable preparatory work was done in the fall in the way of breaking and fencing, and plans were drawn up for commencing the wider range of work in the spring of 1918.

TABLE of Meteorological Observations taken at Beaverlodge, Alberta, from April 1, 1917, to March 31, 1918, showing maximum, minimum, and mean temperature, the highest and lowest for each month with date of occurrence, also, rainfall, snowfall, and total precipitation.

Months.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		Ins.	Ins.	Ins.		Ins.	
April	44·13	25·15	18·98	34·64	57·0	28	7·0	1	0·17	.....	0·19	3	0·15	21
May	57·01	34·19	22·82	45·60	78·0	8	17·0	2	1·38	6·70	2·05	13	0·81	16
June	64·86	41·76	23·10	53·31	78·0	28to30	35·0	1 & 13	0·93	.....	0·93	6	0·41	4
July	72·95	45·80	27·14	59·37	84·0	15 & 18	32·0	29	1·99	.....	1·99	5	1·75	28
August	69·88	43·40	26·48	56·64	84·0	19	30·0	26	1·57	.....	1·57	8	0·90	2
September	61·30	34·80	26·50	48·05	78·0	21	19·0	24	0·21	.....	0·21	4	0·09	2
October	45·80	28·11	17·69	36·95	71·0	9	3·5	21	0·58	9·00	1·48	8	0·60	27
November	46·90	29·10	17·80	38·00	65·0	18	−14·0	30	0·19	2·00	0·39	2	0·19	22
December	−5·48	−19·22	13·74	−12·35	42·0	31	−44·0	28	.....	26·00	2·60	12	0·50	9
January	14·90	−0·32	15·22	7·29	44·0	1	−36·0	29	0·25	8·75	1·12	6	0·50	18
February	18·85	−2·17	21·03	8·34	43·0	22	−34·0	18	.....	12·00	1·20	6	0·40	9
March	29·09	7·67	21·41	18·37	48·0	15	−27·0	5	0·16	12·00	1·36	7	0·50	3
	.....	.....	.....	.....	.....	.....	.....	.....	7·43	76·45	15·09	80	.....	....

EXPERIMENTS AT FORTS SMITH, RESOLUTION AND PROVIDENCE, NORTHWEST TERRITORIES.

FORT SMITH.

The land for the vegetables and roots had been prepared in the fall of 1916, and was ready for sowing in good time in the spring. The following were sown on May 12: Carrots, four white varieties, four red varieties; beets, six varieties; turnips, six varieties; onions, four varieties.

The weather at seeding time was warm and dry, and the drought continued resulting in slow germination. It was the end of May before the first green shoots appeared above ground.

The cabbage, lettuce, tomatoes, and some varieties of onions, sown in the hotbed, did well and promised a good crop after planting out, but were destroyed by a veritable invasion of grasshoppers and grubs.

The five varieties of potatoes planted took more than a month to appear above ground and, just at blossoming time, in July, were destroyed by frost, as were the turnips. A fresh sowing of the latter was made, and the good rainfall in August helped their growth. The grubs destroyed many, but some turnips weighing 5 to 6 pounds each were harvested.

Considerable protection was afforded against grasshoppers by digging trenches round the crops, by the use of Paris green spray, and by placing tar-paper discs round the stalks of cabbage.

The crop of oats, on the St. Bruno farm nearby, was excellent.

Wheat again did not succeed. It will be tried next year on a newly-cleared piece of land, which it is thought may be more favourably situated.

FORT RESOLUTION.

The spring was very backward. Most seeds were sown in the hotbeds in April. Although May was cold, with high winds, the land was got ready in the garden, transplanting from the hotbeds done, and other seeds sown in the open. There were some hot days in the latter part of June, with good rainfalls, but the presence of ice in the lake kept the temperature generally low and retarded growth. Warm weather came suddenly on July 8 and lasted until August 17, with occasional rains, and growth was rapid. On August 17 the temperature fell, there was severe frost, and all grain crops were practically destroyed. The oats were 4 feet high and some of the wheat 5½ feet when frost came.

Hotbeds were tried for the first time, with excellent results.

In vegetables, cabbage, cauliflower, onions, radish, turnips, carrots, beets, peas, lettuce and potatoes yielded fairly well; many other varieties were destroyed by the August frost.

Plum, cherry and apple trees made fair growth but have not yet bloomed. The yields of strawberries, raspberries and gooseberries were lighter than usual.

The showing of flowers in August and September was magnificent.

FORT PROVIDENCE.

All crops were again threatened with destruction by a plague of grasshoppers but, fortunately, frequent cold rains and white frost on June 14 killed nearly all. A fresh swarm came about the end of June, but by that time growth was vigorous and food so abundant everywhere that little damage was done to the crops.

Potatoes were planted May 22-25. In spite of unfavourable conditions, such as being obliged to use half-broken oxen for ploughing, and lack of labour for cultivating, weeding and harvesting, the yield was good. There was no damage from frost.

In vegetables, lettuce, carrots, beets, turnips, peas, onions, cabbage, and cauliflower did well. Tomatoes reached a stage so that they could be ripened in the house after picking.

In grains, Prelude wheat, from seed acclimatized for several years, yielded a good, well-matured crop. The same variety received direct from Ottawa did not mature. This was, perhaps, partly due to the unfavourable situation of the second plot.

Oats and barley ripened well.

EXPERIMENTS AT SALMON ARM, B.C.

Some experimental work with fruit was continued by Thos. A. Sharpe on his farm at the above point.

The season of 1917-18 was abnormal. The winter of 1916-17 showed extreme ranges of temperature, which caused severe winter-killing of fruit trees.

A number of varieties of apple fruited in 1917 for the first time, and some may, on further test, prove valuable. Some thirty varieties from the Central Farm at Ottawa were set out, and have so far made good growth. It is thought that, with the abnormally severe seasons occasionally experienced at Salmon Arm, the best results with fruit trees will be obtained by planting good varieties grown from seed in a severe climate.

In pears, the Dr. Jules Guyot appears best suited for the district. The plum trees so far planted have suffered considerably from the severe winters of 1915-16 and 1916-17. The Italian Prune, Green Gage, and Washington will do well under normal winter conditions. Morello and Duke cherries are the only varieties hardy enough for this district. Peaches have been practically abandoned. No varieties of grapes fruited in 1917 owing to winter injury. The Snyder blackberry was the only one to fruit last year. Raspberries, red, white, and black currants yielded very well.

METEOROLOGICAL record at Salmon Arm for the year ending March 31, 1918.

1917.	Date of highest temperature	Degree.	Date of lowest temperature	Degree.	Rainfall.	Snowfall.	Sunshine.	
					Inches.	Inches.	Hrs.	Min.
April	15—30	61	12	23	1·96	4	169	54
May	10	80	4	27	1·09	.....	208	54
June	14	85	9	38	1·86	.....	201	12
July	19	95	30	42	0·07	.....	353	06
August	16	92	31	43	1·30	.....	311	18
September	16	79	26	35	1·41	.....	187	48
October	3	81	30	25	1·11	3	135	24
November	14	57	25	24	0·76	4½	57	30
December	18	50	23	− 3	0·16	35½	32	18
1918.								
January	2	41	30	− 14	.....	62	25	18
February	10	43	20	− 7	0·10	16	66	00
March	29	56	5	3	0·29	1½	104	18
Totals	.....	.....	.....	.....	10.11	126½	1,853	00

EXPERIMENTS AT SWEDE CREEK, DAWSON CITY, Y.T.

Arrangements were completed during the summer for the carrying on of a limited amount of experimental work on an area of 20 acres on the farm of Mr. Jas. Farr at the above point, and some preliminary work was done in the way of fall ploughing, etc., in preparation for seeding operations in the spring of 1918. For climatic reasons, and owing to the difficulty of transporting supplies, fertilizers, farm implements, etc., the amount of work which it will be possible to carry on at this point will be small, but it is hoped that some interesting and profitable results may be obtained.

DIVISION OF CHEMISTRY.

REPORT OF THE DOMINION CHEMIST, FRANK T. SHUTT, M.A., D.Sc.

The year's work has been more particularly marked by an increased correspondence from farmers, a large influx of samples of an agricultural nature sent in for examination or analysis, and a very considerable addition to the purely analytical work of the Division in the matter of samples of food products submitted in connection with the Oleomargarine Act and supplies purchased in Canada for the British War Office and civilian use overseas.

It is a matter of satisfaction to record that farmers are more and more availing themselves of what may be termed the educational and advisory assistance offered by the Division. This phase or branch of the Division's activities permits the direct meeting of the needs of the individual—the man on the land—in the solution of his particular problems, and undoubtedly has very materially assisted in the campaign for increased production of foodstuffs throughout the Dominion.

The number and nature of the samples submitted to examination and reported on during the year are recorded in the following table:—

SAMPLES received for Examination and Report during the twelve months ending March 31, 1918.

Samples.	British Columbia.	Alberta.	Saskatchewan.	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Total.
Soils	44	193	5	2	28	37	6	4	.....	319
Muds, mucks and marls	2	.....	3	.....	3	13	5	21	3	50
Manures and fertilizers	6	2	.....	.....	31	47	18	15	3	122
Forage plants, seeds and fodders	18	31	14	8	132	38	12	8	2	253
Waters, including rain and snow	9	29	28	4	146	16	2	6	4	244
Samples from Meat and Canned Goods Division	.....	.....	.....	.....	.....	.....	.....	.....	.....	840
Miscellaneous, including dairy products, fungicides, insecticides, etc.	14	24	13	2	215	59	7	12	7	353
War Office samples (flours)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,668
	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,849

EXAMINATION OF SOILS FOR FARMERS.

More than 200 samples of soil sent in by farmers have been examined and reported on. These have not been submitted to a complete chemical analysis. Apart from the fact that it would have been quite impossible to undertake a work of such magnitude in addition to our other labours, the value of the results for the purpose in view would in no wise be commensurate with that of the time expended thereon. It must be pointed out that chemical analysis, though of fundamental importance in connection with virgin areas, is in itself insufficient as a guide to the quantities and forms of plant food that will give a profitable response, when considering soils of long cultivation. The final court of appeal for such information is, in the majority of cases, the soil itself; practical trials, fertilizer experiments, must be resorted to for final and conclusive evidence on this point.

We are, however, able, from the examination made, to give the farmer information of a suggestive and valuable character as to treatment with manures, fertilizers, the necessity or otherwise or drainage and liming, the presence of alkali, suitable crops,

etc., and chemical and physical work on the samples to that end is performed. In order that this work of diagnosis may be the more effective, it is required that the farmer shall collect the soil sample in accordance with instructions issued by the Division and, on the "form" supplied, furnish information as to the history of the soil as regards its manuring and cropping, the nature of the subsoil, drainage, and the outstanding features of the climatic conditions of the district.

INVESTIGATIONAL WORK WITH FERTILIZERS.

Experiment "A".—The plan of this experiment includes 48 fertilized or manured plots on which the treatment is varied with a view to ascertaining the most economic quantity and proportional composition of a fertilizer, as measured by its influence throughout the period of a three-year rotation consisting of (1) potatoes or other hoed crop, (2) grain, (3) hay.

The experiment was introduced, in the year 1915, on the Farms and Stations of the Experimental Farms system at Charlottetown, P.E.I., Kentville, N.S., Fredericton, N.B., Cap Rouge, Que., and Agassiz, B.C., and, the following year, at Nappan, N.S., Lennoxville, Que. and Sidney, B.C.

The final returns from the experiment at the five first-mentioned stations are now available. Prominent features noted in the results from the individual stations include the very decided influence of phosphoric acid at Charlottetown, where it proved the limiting fertilizer factor. By increasing the quantity of phosphatic fertilizer applied, the profitable use of larger nitrogenous applications was permitted, whereas, with inadequate phosphoric acid, an increase in the amount of nitrogen proved ineffective.

On the light, sandy loam soil at Kentville, the plots with manure and fertilizers produced yields superior to those from either manure or fertilizers alone. Indeed, at all the stations the combinations of manure and fertilizers ranked highly and took highest place in the averages.

At Fredericton, the heaviest fertilizer applications were found both most productive and most profitable.

A study of the average returns from five stations is most interesting and reveals the fact that, without a single exception, the fertilizers were profitably employed.

The average profit—for the three years—from the plots receiving both manure and fertilizers was over $30 per acre, while the average profits from fertilizers alone during the same period was slightly over $15 per acre.

These calculations are based on the normal pre-war prices of all the commodities. Under present conditions of the market—notwitstanding the increased cost of fertilizers—the profits would appear greater.

Experiment "B".—This experiment is conducted concurrently with "A" at the Farms and Stations already named. It is designed to ascertain the relative merits of nitrate of soda and sulphate of ammonia as sources of nitrogen, and of acid phosphate, basic slag, and bone meal as source of phosphoric acid. At all five stations, nitrate of soda has proved superior to sulphate of ammonia and, at four, acid phosphate appears to have been more effective than either basic slag or bone meal.

Experiment on Flax.—This experiment was conducted in co-operation with the Economic Fibre Division at the Central Experimental Farm, with the object of ascertaining the influence of fertilizers on the yield and quality of the flax fibre. At present only the total yields have been recorded. The experiment contained 15 plots, 3 of which were checks. The others were variously fertilized. The mixture which proved most profitable consisted of 200 pounds of nitrate of soda, 400 pounds acid phosphate, and 125 pounds muriate of potash per acre. This produced an increase of 1,410 pounds of straw per acre over the average yield from the check plots. Each fertilized plot outyielded the checks, the average increase being 873 pounds per acre.

Experiment on Seed Mangels.—This experiment was carried out in co-operation with the Forage Crop Division, at the Central Experimental Farm. Substantial increases in seed production attended the use of the various fertilizers. The average yield from the fertilized plots was 1,208 pounds of seed per acre, as compared with an average of 855 pounds from the check plots.

The most profitable treatment seems to have been 150 pounds nitrate of soda, 800 pounds acid phosphate, and 120 pounds muriate of potash per acre, used in conjunction with 12½ tons of manure, the yield of seed thereby produced being 1,460 pounds per acre.

Experiment with Nitrate of Lime.—With the object of ascertaining the fertilizing value of nitrate of lime (Norwegian saltpetre) as compared with that of nitrate of soda and sulphate of ammonia, this experiment was conducted. Unfortunately, seasonal and soil conditions proved unfavourable, and, in consequence, the yields throughout were exceptionally small. The results indicated, however, that the nitrogen in nitrate of lime has proved quite as efficacious as that in either nitrate of soda or sulphate of ammonia.

Experiment with "Rito"—a humatized Peat.—This material, obtained from England, is said to be a chemically treated peat, though the nature of the treatment is not apparent.

The results of the experiments, conducted at the Central Experimental Farm, have furnished no evidence of any appreciable fertilizing influence having been exerted by the material.

Experiment with Nepheline Syenite.—A pot experiment in the greenhouse has been commenced with a view to ascertaining the value of finely ground nepheline rock as a source of potash. The experiment has not yet reached a stage where the drawing of inferences would be warrantable.

Experiment, Plan E.—This is a new scheme which—in modified form—was introduced at Lacombe, Alta., and Summerland, B.C., in 1917. This year (1918) it has been adopted at six of the eastern stations, and will be continued for a period of three years. In the plan several new features have been introduced, some with the object of solving problems which have lately arisen.

FERTILIZER MATERIALS.

Ground Limestone.—Every season furnishes additional proof of the statement that there are many soils in Eastern Canada upon which lime or ground limestone may be profitably used. Their value as amendments for sour soils, soils rich in humus but deficient in lime, and heavy clay loams, has been abundantly shown. Our correspondence indicates that farmers are paying more attention to this subject, and we have, at the request of agricultural societies and provincial departments of agriculture, analysed a number of limestones and reported upon them as to their value for the purpose of making crushed or ground limestone. The larger number of the samples have come from the Maritime Provinces, and in the majority of instances they have been shown to be of excellent quality, containing over 90 per cent of carbonate of lime.

In this connection it may also be stated that a number of samples of marl have been analysed. These have been chiefly from deposits in Ontario and Quebec. Air dried marl of good quality will contain from 70 to 95 per cent of carbonate of lime. It is a lime compound particularly suitable for soil treatment, and may often be procured at little cost above that of hauling. Marl deposits are of not infrequent occurrence in Eastern Canada and in British Columbia.

Wood Ashes.—Owing to the war, the German potash compounds which supplied the fertilizer trade of the world are unobtainable. Attention must therefore be paid to home sources of this valuable element. Chief among these sources in Canada may

be placed wood ashes, which, in addition to their potash content (5 to 6 per cent), contain notable amounts of phosphoric acid and lime. Samples analysed during the year have shown great variation in their potash content, evidently due to the degree of care with which the ashes have been collected and preserved. It is all-important that this valuable fertilizer should not be thrown out and wasted. In their preservation and storage it is particularly desirable that the ashes should be protected from leaching rains.

Ashes from city incinerators and other sources have also been examined and reported on as to their fertilizing value.

Swamp Muck and Peat.—These materials may frequently be found to have a manurial value in furnishing humus-forming material and nitrogen. Generally speaking, they are improved and their plant food rendered more available if first composted or used as a supplemental litter to absorb liquid manure. The number of samples sent in for examination indicates that farmers are becoming more and more aware of the value of these naturally-occurring materials for improving their soils. Air-dried peat has a very considerable absorbent value and good samples will contain about 75 per cent organic matter and from 1·5 per cent to 2·5 per cent of nitrogen.

Miscellaneous Materials of Fertilizing Value.—The year's work includes the analysis of a number of materials, waste products from manufacturing processes and natural deposits, etc., to determine their fertilizing value.

Utilization of Nitre Cake in the manufacture of Superphosphate.—Nitre cake is the residue from the manufacture of nitric acid from Chili saltpetre (sodium nitrate) and is at present largely a waste product. Our investigational work, still in progress, indicates that it may find a useful purpose in the treatment of rock phosphate for the manufacture of superphosphate. Though not so efficient for this purpose as sulphuric acid, the data so far obtained are very encouraging, several grades of superphosphate with notable percentages of available phosphoric acid having been prepared.

Nepheline Syenite.—This is a potash-bearing silicate rock, and experiments are in course to ascertain to what degree its potash may be rendered available for crop use by (1) grinding to a fine degree of fineness, and (2) treatment with sulphuric acid in conjunction with natural phosphates. Although a considerable amount of work has been done in this research, the investigation has not yet proceeded far enough to warrant any prediction as to the economic value of this material as a source of agricultural potash.

FERTILIZING VALUE OF RAIN AND SNOW.

The eleventh year of this investigation, which has for its object the determination of the nitrogen compounds (free and albuminoid ammonia and nitrogen in nitrates and nitrites) in the rain and snow, closed on February 28, 1918. During the year 68 samples of rain and 35 of snow were analysed. The total precipitation was 32·86 inches (rain 19·99 inches, snow 128·75 inches) and the total nitrogen supplied thereby amounted to 6·259 pounds per acre.

Summarizing the data we obtain the following interesting figures, the averages for the preceding decade being added for the purpose of comparison:—

AMOUNTS of Nitrogen furnished by Rain and Snow.

	By rain, pounds per acre.	By snow, pounds per acre.	Total, pounds per acre.
Year ending February 28, 1918..	4·719	1·540	6·259
Average for 10 years ending February 28, 1917..	5·482	1·101	6·583

From the agricultural standpoint this enquiry has contributed materially to our knowledge regarding the value of the precipitation as a source of available nitrogenous crop food.

SOILS FROM IRRIGATION TRACTS IN ALBERTA.

This work, now in its fourth year, was undertaken to assist the Irrigation Branch of the Department of the Interior in the classification of certain areas in Alberta into irrigable and non-irrigable lands. The determination of the amount and composition of "alkali" constitutes the chief work in this investigation. The water-soluble content of approximately 50 groups of soil (200 samples) has been determined during the year.

AGRICULTURAL METEOROLOGICAL RESEARCH.

This investigation, the outgrowth and extension of preliminary work to ascertain the influence of soil and climatic conditions on the composition of wheat, is now carried on with the co-operation of the Meteorological Service, Toronto. Briefly, it constitutes an attempt to correlate seasonal and soil conditions with growth and crop yield throughout the Dominion. The observations in connection therewith are being made at 14 of the branch Farms and Stations. Progress in arriving at definite conclusions is necessarily slow; many seasons' observations and analyses must first be classified and correlated. The work, however, promises well to furnish information of very considerable value to Canadian agriculture.

SUGAR BEETS FOR FACTORY PURPOSES.

For the past sixteen years a systematic testing out of approved varieties of sugar beets, both as to yield and quality, has been carried on at the several Farms, Stations and Substations of the Experimental Farm system. By this means, valuable information has been amassed as to the suitability of soil and climatic conditions for the successful culture of this crop at a number of widely distant points throughout the Dominion.

Among the varieties experimented with during the past season (1917) are the following: Klein Wanzleben and Vilmorin's Improved (seed from Vilmorin, Andrieux et Cie., Paris), Russian and Ontario-grown seed, supplied by the Dominion Sugar Co., Wallaceburg, Ont. Averaging the results from the beets grown at the several Farms and Stations, we obtained the following data which must be regarded as exceedingly satisfactory:—

VARIETIES of Sugar Beets, 1917.

Variety.	Sugar in juice (average).	Coefficient of purity (average).
Klein Wanzleben	17·34	87·54
Vilmorin's Improved	16·84	90·05
Russian grown (variety unknown)	17·74	86·92
Ontario grown (variety unknown)	18·22	87·27

The gratifying and outstanding feature in the above results is that the Ontario-grown seed produced beets fully equal in sugar content to those from the best imported seed.

Interesting and valuable data are presented in the following table which gives the percentage of sugar in juice as averaged from beets of the four above-named varieties grown at the several Farms and Stations:—

AVERAGE percentage of Sugar in Juice in Sugar Beets, 1917.

	Sugar in juice, per cent.		Sugar in juice, per cent.
Charlottetown, P.E.I.	19·09	Scott, Sask.	18·12
Kentville, N.S.	19·48	Indian Head, Sask.	19·42
Nappan, N.S.	20·20	Fort Vermilion, Alta.	17·31
Fredericton, N.B.	17·93	Lethbridge, Alta. (irrigated)	18·99
Cap Rouge, Que.	11·87	" " (non-irrigated)	18·54
Ste. Anne de la Pocatière, Que.	12·82	Agassiz, B.C.	16·96
Ottawa, Ont.	16·37	Sidney, B.C.	17·20
Brandon, Man.	16·07	Summerland, B.C.	18·35
Rosthern, Sask.	15·51		

These results, in the majority of cases, are somewhat higher than the average obtained from the data of the past five years, indicating not only that good seed was used but that favourable seasonal conditions for the beet crop prevailed at the larger number of points.

FIELD ROOTS.

Continuing our work on the relative feeding values of field roots—mangels, turnips, and carrots—commenced 13 years ago, the following summaries may be presented from analyses made of the 1917 crop. All the roots examined were grown on the Experimental Farm, Ottawa.

Mangels.—Thirty-one varieties were tested, including those of the several types generally recognized and for sale by seedsmen.

MANGELS, 1917.

	Dry matter.	Sugar in juice.
Maximum	17·28	11·50
Minimum	8·72	3·86
Average of 31 varieties	12·64	6·72
" for 13 years	10·97	5·70

The series included a fairly large number of the best varieties from the standpoint of nutritive value, but it may also be remarked that the season at Ottawa was particularly favourable to the root crop. The averages for dry matter and sugar have only twice previously been equalled in this investigation and never exceeded.

To ascertain the influence of inherited qualities, Gate Post and Giant Yellow Globe, representatives of two distinct and well-recognized types of mangel, have been grown side by side at Ottawa under similar conditions of soil, etc., annually for a period of 18 years, and the crop analysed. The results have shown, without a single exception, that, both in dry matter and sugar, the Gate Post is superior to the Giant Yellow Globe.

GATE POST and Giant Yellow Globe Mangels.

	Dry matter.	Sugar in juice.
Gate Post—1917 crop	14·24	7·41
" " average for 18 years	11·71	6·11
Giant Yellow Globe—1917 crop	11·39	5·89
" " " average for 18 years	9·56	4·62

Though, as our detailed results clearly show, the composition of the mangel is influenced by seasonal conditions, the above data furnish satisfactory proof that distinct varieties possess in a marked degree qualities due to heredity, and which may be transmitted. The results of this investigation point to the desirability of farmers paying more attention in their selection to the matter of composition (nutritive value) and not relying solely on the matter of yield.

Turnips.—Fifty-nine varieties of turnips (swedes and fall turnips) were analysed, the series including a number tested for the first time in 1917.

TURNIPS, 1917.

——	Dry matter.	Sugar in juice.
	p.c.	p.c.
Maximum	13·59	2·16
Minimum	9·29	1·10
Average for 1917	11·04	1·41
Average for 12 years	10·30	1·25

The foregoing data indicate that a very considerable difference in percentage of dry matter may exist, as with mangels, among the varieties of turnips. Yield and keeping qualities are essential factors in the selection of the varieties to be grown, but the results clearly emphasize the importance of paying some regard to the matter of composition. Though in many instances turnips closely approach or equal mangels in dry matter content, they are decidedly inferior as a class to mangels as regards sugar.

The summarized particulars for the swede (45 varieties) and fall (13 varieties) turnips may be presented as follows:—

SWEDE and Fall Turnips, 1917.

—	Swede.		Fall.	
	Dry matter.	Sugar in juice.	Dry matter.	Sugar in juice.
Maximum	13·59	2·17	11·16	1·46
Minimum	9·39	1·03	9·29	0·88
Average	11·05	1·45	10·13	1·19

From this series we may conclude that the swede is decidedly more nutritious than the fall turnip; the former contains a notably higher percentage of dry matter and is slightly the richer in sugar.

Carrots.—Thirteen varieties of carrots were examined in 1917. The series included those which had been tested for a number of years, together with two or three more recently introduced varieties.

CARROTS, 1917.

—	Dry Matter.	Sugar in Juice.
Maximum	15·55	3·73
Minimum	11·19	2·33
Average of 13 varieties, 1917	12·69	2·92
Average for 12 years	9·83	2·51

The season was evidently most favourable for the development of this class of field root, the highest averages, for both dry matter and sugar, being obtained in the investigational period of 12 years. A notable variety in the series was the Yellow Intermediate, with nearly 2 per cent more dry matter than the next highest; five varieties contained over 13 per cent dry matter and five between 12 per cent and 13 per cent.

The following interesting table summarizes the data for the period of the investigation:—

AVERAGE Composition of Mangels, Turnips and Carrots.

Class of Root.	Period.	Dry Matter.	Sugar in Juice.
Mangels	13 years	10·97	5·70
Turnips	12 "	10·30	1·25
Carrots	12 "	9·83	2·51

FEEDS AND FEEDING STUFFS.

Consequent upon war conditions, the price of feeds and feeding stuffs in general has greatly advanced during the past year. Further, as a result of the same conditions, many mill feeds of an exceedingly poor character—chiefly by-products from the oatmeal mills—have been put on the market, many of them at prices far exceeding their value. As might be expected, therefore, our correspondence from farmers seeking information and advice in this matter has been very large. More than 250 samples of feeds submitted by farmers and dairymen have been analysed and reported on as to nutritive value. As far as might be practicable or possible, advice has been given as to the desirability of purchasing at the prices asked, the probability of the economical use of the feeds in question and their relative value as compared with standard feeds on the market.

The feeds examined include bran, shorts, middlings, feed flours, wheat germs, oil cake meal, cotton-seed meal, elevator screenings, gluten feeds, corn feeds, barley feeds, oat feeds, fish meal, tankage, mixed ground mill feeds, cocoanut meal and a number of proprietary feeds sold under brand names, for pig feeding, dairy stock, poultry, etc. A number of grasses, hays, and ensilages were also analysed.

The subject is altogether too large and too varied in character to be satisfactorily treated of in summarized form, but a bulletin giving the more important features of the work is now in course of preparation.

FLOUR.

The official examination of flours purchased in Canada for the British War Office and civilian supplies overseas has been continued. The year's work includes the analysis of 1,668 samples as to moisture content.

A very considerable amount of investigatory work has been done in the determination of moisture *in vacuo,* and in different types of drying ovens. A satisfactory method has been evolved in which 2 grams of flour are heated for 5 hours to 100° C. in a Freas electric vacuum oven.

MEAT INSPECTION DIVISION WORK.

The work in the examination of packing house products, etc., submitted by the Meat Inspection Division, Health of Animals Branch, for the year 1917-18, has comprised 840 samples, which may be classified as follows:—

Preserved meats, sausages	35
Lards, tallows, oils, butters	284
Dye stuffs, colouring matters	71
Preservatives, pickling solutions	79
Spices, condiments, etc	35
Evaporated apples, canned fruits and vegetables	281
Miscellaneous	55
Total	840

A method for the detection of the presence of solid fat adulterants in lard was critically examined and very satisfactory results obtained. The process permits the possibility of establishing the presence of any foreign fat, including hardened or hydrogenated oils, containing the glyceride, tristearin. Adulterants of the nature of hydrogenated cotton-seed or soya bean stearin may be detected by this method when present in as small a proportion as 1 per cent.

The Oleomargarine Act came into force during the year, the chemical work necessarily involved in its administration falling upon this Division. The chief examination in connection therewith has been the critical analysis of the butters used in the manufacture of this product, with the view of determining their freedom from artificial colouring matter. The several methods described in the standard texts for

the detections of added colour in butter and butter compounds were all found more or less unsatisfactory and inconclusive. As a result of this review, a method was finally adopted which reveals the presence of oil-soluble coal tar dyes or vegetable colours when present in the proportion of 1 part of dye or colour to 50,000 of fat. Approximately, 150 samples of butter have been examined by this method since the Act came into force. The reports in connection with the samples submitted by the Meat Inspection Division are made to the Veterinary Director-General.

INSECTICIDES AND FUNGICIDES.

The very marked increase of late in the price of Paris green, consequent upon war conditions, has directed the attention of horticulturists and manufacturers of insecticides to other and cheaper arsenicals for spraying purposes. Prominent among these compounds are arsenate of lime (calcium arsenate) and arsenite of lime (calcium arsenite). A number of samples of both preparations have been analysed and reported on as to composition and arsenic content. Both of these compounds are very much cheaper than Paris green or arsenate of lead.

Arsenate of Lime.—This has been put upon the market in both paste and powder form. Reliable brands in the dry powder form contain arsenic equivalent to, approximately, 40 per cent arsenic oxide, less than 1 per cent of which is soluble in water. One brand analysed contained 32·75 per cent arsenic oxide. The arsenical content of the paste forms is about half that of the dry powder, but necessarily will be variable, dependent upon the percentage of water present. A very considerable amount of practical experimental work has been done with this compound by the Entomological Branch and its efficiency as an insecticide has been established. It is advised, however, in order that there may be no risk of injuring the foliage, that it should always be used in Bordeaux mixture, lime-sulphur solution, or other of the sulphide sprays, with all of which it suffers no deterioration or loss of toxic value. Thus used it has proved an efficient and safe spray for apples and potatoes.

Arsenite of Lime.—There is as yet but little reliable evidence from field and orchard experiments as to the practical value of arsenite of lime as a spray. There is no doubt as to its toxic properties, but more work is necessary before its position as a safe spray for orchard work, i.e., one which can be used without injury to foliage, can be established. There seems, however, little doubt but that it will be found an effective and safe insecticide for the potato crop, if used in Bordeaux mixture or with an excess of lime in the spray. Several brands of arsenite of lime have been analysed, showing an arsenious oxide content varying from 14 to 24 per cent.

Manufacturers of these compounds should state plainly and distinctly on the label of the package the form (arsenate or arsenite) in which the arsenic is present and the percentage of arsenic in the compound and the net weight of the arsenical in the package.

Among the insecticides and fungicides examined were sodium cyanide, Paris green, arsenate of soda, bluestone, nicotine extracts, formaldehyde, and several preparations put out as gopher poisons.

WELL WATERS FROM FARM HOMESTEADS.

The examination of well waters for farmers, a feature of the work of the Division for the past thirty years, continues to meet with a wide appreciation throughout the Dominion.

Our reports show that of the waters submitted during the year 22 per cent were pronounced pure and wholesome, 20 per cent suspicious and probably dangerous, 26 per cent seriously polluted, and 32 per cent as too saline to be potable.

Samples of water for analysis must be forwarded in accordance with the directions issued by the Division and obtainable on application. The examination is made free of charge but express charges must be prepaid.

DIVISION OF FIELD HUSBANDRY.

REPORT OF THE ASSISTANT DOMINION FIELD HUSBANDMAN, W. L. GRAHAM, B.S.A.

The Field Husbandry Division during the past year continued the scheme of soil culture and crop rotation investigations that has now been under way for a period of years on the branch Experimental Farms and Stations. At the Central Farm, Ottawa, the work is limited, due to the shortage of suitable land; nevertheless the results obtained are encouraging.

Special attention is given to the cost of production of field crops on the different Farms and Stations, and observations are made of the influence which labour-saving implements have in this respect.

WEATHER CONDITIONS AND CROP YIELDS, CENTRAL FARM, OTTAWA.

The results in field crops on the Central Farm for the season of 1917 were fairly satisfactory. Seeding commenced on April 28, and was completed May 14. Potatoes and roots were planted towards the middle of May, and corn planting was finished by the end of the month. Growth was slow on account of the cool weather, but improved during the favourable weather in June. The fore part of the haying season was very wet, and operations were delayed considerably; however, the work was completed during the fine weather of the closing week of July. Grain was harvested and threshed during August, and Indian corn was put into the silo during the latter part of September. October was cool and wet with much less sunshine than usual, making fall work tedious. Turnips and mangels were harvested during the month. Fall ploughing was finished early in November, and some underdraining was completed.

YIELD of Field Crops, Central Farm, 1917.

Crop.	Area.	Total Yield.				Average Yield per Acre.			
	Acres.	Tons	Lb.	Bush.	Lb.	Tons	Lb.	Bush.	Lb.
Corn	40	662	1,805	.....	.....	16	1,146	.....	.....
Oats	40	.....	.....	2,106	16	.....	.....	52	22
Oat straw	40	44	1,985	.....	.....	1	250	.....	.....
Hay	34	106	1,050	.....	.....	3	267	.....	.....

COST OF PRODUCTION OF FIELD CROPS.

The accompanying data of the cost of production of field crops are determined from fixed values used from year to year, regardless of fluctuations in labour and market prices.

COST of Production of Field Crops, Central Farm, 1917.

Crop.	Area.	Yield per Acre.		Cost to Produce.		
				Per Acre.	Per Ton.	Per Bush.
	Acres.	Tons	Bush.	$ cts.	$ cts.	cts.
Corn	40	16·57	.....	28·24	1·70	.....
Oats	40	.....	52·67	16·83	.....	26
Oat straw	40	1·12	.....	16·83	3·01	.....
Hay	34	3·13	.....	20·14	6·43	.....

ROTATION OF CROPS.

For various purposes, fifteen rotations are under way at the Central Farm. From these tests important conclusions and data have already been drawn. The rotations conducted under regular farm conditions are as follow:—

Rotation "A" (five years' duration).—Hoed crop, manured; grain seeded down with clovers and grass; clover hay, top-dressed with manure in autumn; timothy hay, field ploughed in August, top-worked and ribbed up in October; grain seeded down with red clover to be ploughed under the following spring, when the succeeding hoed crop is corn.

Rotation "B" (five years' duration).—Hoed crop, manured; grain, seeded down with clovers and grass, top-dressed with manure in autumn; clover hay, ploughed in autumn; grain, seeded down with clovers and grasses; clover hay.

Rotation "C" (four years' duration).—Hoed crop, manured, grain seeded down with clovers and grass; clover hay; timothy hay, field ploughed in August, top-worked and ribbed up in October.

Rotation "D" (three years' duration).—Hoed crop, manured; grain, seeded down with clovers and grass; clover hay.

Soiling Crop Rotation "R" (three years' duration).—Corn for early fall feed, manured; peas and oats to cut green, seeded down with clovers and grass; clover hay to cut green.

The records for the past year from the rotations outlined in the foregoing are given herewith.

COSTS, Returns and Net Profits from Rotations "A", "B", "C", "D" and "R", 1917.

Rotations.	Cost to operate per acre.	Value of return per acre.	Profit per acre.
	$ cts.	$ cts.	$ cts
A (five years' duration)	18·89	23·74	4·85
B (five years' duration)	18·85	20·28	1·43
C (four years' duration)	18·76	21·40	2·64
D (three years' duration)	20·93	26·29	5·36
R (three years' duration)	21·24	26·97	5·73

CULTURAL INVESTIGATIONS.

The following cultural investigations are being conducted at the Central Farm, Ottawa:—

Shallow ploughing and subsoiling versus deep ploughing.—For this experiment two four-year rotations are used, differing only in the preparation of the sod areas for roots or corn as indicated in the foregoing heading. The results, as in the past, fail to show any decided advantage in favour of either method.

Commercial Fertilizer as a part substitute for barnyard manure.—Four four-year rotations are used in this experimennt which is designed to supply information regarding the fertilizer merits of:

(1) No manure or fertilizer but pastured one year in four.
(2) Barnyard manure.
(3) Complete commercial fertilizer.
(4) Barnyard manure and commercial fertilizer.

Rotation and Cultural Experiments on the Branch Experimental Farms and Stations.—Besides the investigations under way at Ottawa, crop rotations and soil cultural experiments have received attention on several of the branch Farms and Stations for a period of years. A good rotation for the eastern provinces has been found to include (1) roots, corn or other cultivated crop; (2) some cereal crop; (3) meadow or pasture. Various combinations of these three groups are possible. Certain combinations are likely to give good results under conditions as they exist in the eastern provinces. Certain other combinations of these groups, with possibly the inclusion of a summer-fallow year in the course, are likely to prove satisfactory under climatic conditions as they exist in the prairie provinces.

The soil cultural problems that have proved difficult to solve in the prairie provinces are those having to do with prairie breaking, preparing land for crops, moisture conservation, forage crop production, conservation or increase of soil fertility and weed eradication. With a view to giving information as to methods of cultivation likely to give best results along the foregoing lines a number of experiments are under way at Brandon, Indian Head, Rosthern, Scott, Lacombe, and Lethbridge. In the east at Charlottetown, P.E.I., work of a similar nature has been started.

Several years' data will likely be required of both rotation and cultural work before definite conclusions can be drawn. More detailed observations on this work will be found in the summary reports from the branches.

DIVISION OF ANIMAL HUSBANDRY.

REPORT OF THE DOMINION ANIMAL HUSBANDMAN

E. S. ARCHIBALD. B.A., B.S.A.

At the Central Experimental Farm, Ottawa, the live-stock work has progressed quite satisfactorily during the past year. The conditions as to housing, feeding, and general management of the stock were excellent. The abundant supply of ensilage, green feed, and hay, and the excellence of the pastures, maintained production and the growth of the young stock in spite of the great scarcity and the high prices of grains and meals. However, the pasture areas are still too limited for most economical production and for most progressive work, especially in the case of sheep and swine.

There are now 635 head of live stock in the stables, made up as follows: 188 dairy cattle, 32 horses, 199 sheep, and 216 swine. All the live-stock have made a fairly good showing during the past year. The amount of experimental work was most satisfactory, though somewhat curtailed by war conditions. The sales of dairy products amounted to $11,371.41; of dairy cattle, $5,587.00; of beef cattle, $7,426.58; of sheep, mutton, and wool, $1,462.50; and of swine for pork and breeding purposes, $6,617.31. These sales, coupled with the increased values of the various herds and flocks, the value of manure at only $1 per ton, the horse labour supplied other Divisions at only 70 cents per day, makes a sum total of $50,703.85, an increase of $6,498.98 over the past year.

HORSES.

The horses do all the labour connected with the various Divisions of this Farm. At present there are thirty--two head, which include twenty-five draught horses and draught colts, four expressers and three drivers. The heavy draught horses include four imported Clydesdale mares and several grade Clydesdale mares. All the horses are in excellent condition. Breeding operations with horses have been satisfactory during the year, and the crop of excellent colt foals is making substantial progress.

Experimental work along the lines of feeding, care, and management of mares and young stock, the values of vaccines as prevention of Joint Ill, all gave most promising results.

The horses have increased in value during the past year by $1,385. The horse labour supplied amounted to 7,660.5 days which, at the very low valuation of 70 cents per day, gives a total return of $5,362.35. Even with these low valuations of labour and manure, and in spite of very high feed values, this department showed a balance sufficient to offset labour, feed, shoeing, harness and repairs, and purchases.

BEEF CATTLE.

Owing to the lack of suitable buildings and of pastures, no breeding beef cattle are maintained on this Farm.

However during the past winter two carloads of western steers were finished for market. These steers were purchased on the Winnipeg market and shipped to Ottawa during the first week of December, 1917. Upon arrival they were dehorned and housed in a very cheap single-board, single-story shed, which had an open front facing a protected yard in which the feed racks and water troughs were placed. The steers were divided into two groups, separating the heavy and light steers, and the former group was fed more heavily for a quicker finish. In spite of the exceedingly cold winter, all steers remained very healthy throughout the entire feeding period of 116 days. Group I (heavy steers) made 1.93 pounds daily gain per steer, and a profit over feed of $5.68 per steer. Group II (lighter steers) made 1.75 pounds daily gain per steer and a profit over feed of $5.11 per steer.

Considering the very high prices of feeds, these are fair profits. No extra labour was required for this feeding, as the regular hands of the stables did all feeding, which was quickly performed by hauling feeds once daily with horses direct from mows and silos.

These steers sold on the Montreal markets at $12 to $13 per hundredweight, which was the top price at that time. Although only a small cash profit was realized on this investment when considering initial cost, freight, labour, feeds, bedding and interest on investment, yet there remain over 250 tons of excellent manure which may be conservatively valued at $2 per ton.

DAIRY CATTLE.

Four pure-bred and two grade herds are maintained, namely: Ayrshire, 57 head; French Canadian, 27 head; Holstein, 43 head; Jersey, 27 head; Grade Ayrshire, 15 head; and Grade Holstein, 19 head. This total of 188 head of dairy cattle of all breeds and ages is an increase of 34 over March 31, 1917. A most unexplainable outbreak of tuberculosis amongst these herds during the past year was responsible for the loss of several good animals, and consequent diminished returns. However, in spite of this, gross receipts from the dairy herds were very heavy.

Dairy cattle experiments.—Much of the experimental work with dairy cattle was temporarily discontinued owing to war conditions. However, the following lines of work have been maintained, and in some cases extended. In a study of feeds and feeding, four lines of work were continued, namely, (1) study of pasture supplements; (2) comparison of meals available on Canadian markets; (3) quantities of meals which may be profitably fed to dry cows and cows in milk; (4) costs of rearing young stock with milk and various milk substitutes. This latter work has been so satisfactorily conducted as to reach some definite conclusions, and the results thereof will be available in bulletin form in the near future.

Co-operative milk record forms have been distributed in larger numbers than heretofore, which evidences greater interest amongst dairy farmers in greater production and increasing profits.

The continued study of all the various makes of milking machine has been most satisfactory, and this work is now being summarized for a separate publication. It is of

interest to note that one machine, "Hinman," was added to this equipment during the year, and to date has given excellent results in every way.

Many different fly sprays and poisons were used comparatively during the past year, the majority of which were quite satisfactory.

The careful study of contagious abortion in cattle was continued. The work with serums and vaccines as a preventative to abortion was continued by the Health of Animals Branch, and satisfactory results obtained.

Dairy cow returns.—Although the following table shows a lower production and profit over feed per cow, yet this is scarcely a fair basis for judging the status of the herd, as many of the best cows of all breeds had not completed their lactation periods during the year, and of those which did finish, a large number were heifers. Again, feed prices were so very high that the relative profits were lower in spite of increased values of milk and butter.

AVERAGES.

No. of head.	Breed.	Age.	Average days in milk.	Average pounds milk produced.	Average per cent fat in milk.	Average profit over cost of feed between calvings. Labour, manure, and calf, etc., not included.
55	All breeds and grade	5	325	8,065	4·10	95·18
5 best	Ayrshires	8	306	8,940	4·01	109·30
14 total herd		6	312	7,324	3·83	82·42
5 best	Canadians	6	316	7,738	4·78	110·33
5 total herd		6	316	7,738	4·78	110·33
5 best	Holsteins	6	383	13,103	3·61	140·75
15 total herd		5	345	9,857	3·68	110·97
5 best	Jerseys	3	343	6,618	5·34	110·57
9 total herd		3	305	5,374	5·28	86·22
4 best[1]	Grade	6	332	5,590	4·15	78·73
4 total herd	Ayrshires	6	332	5,590	4·15	78·73
5 best	Grade	7	343	10,892	3·88	131·44
8 total herd	Holsteins	5	348	9,773	3·86	113·25

[1] Only four head in grade Ayrshires.

Official records.—In spite of labour and feed shortage, a few cows were again entered in official records and, although working under very average commercial conditions, made the following very creditable records:—

CANADIAN record of performance, April 1, 1917, to March 31, 1918.

Name and number of cow.	Breed.	Age at commencement of test.	Number of days milking.	Pounds of milk produced.	Pounds of fat produced.	Average per cent fat.
Flavia 3rd of Ottawa..28100	Ayrshire....	8 years	328	10,880	408	3·75
Aromaz..... 1597	Fr. Canadian.....	8 "	365	13,219	631	4·77
Evergreen, March 3rd.12658	Holstein....	6 "	329	14,570	489	3·35
Ottawa Bessie Ann....27130	"	3 "	365	10,891	400	3·67
Rhoda 2nd's Maud.... 7314	"	10 "	359	11,794	379	3·21

CANADIAN-HOLSTEIN-FRIESIAN record of merit, April 1, 1917, to March 31, 1918.

Name and number of cow.	Age at commencement of test.	Number of days in test.	Pounds of milk produced.	Pounds of fat produced.	Pounds 80% butter produced.
Butter Boy Keyes 2nd Lass....19686	6 y., 10 m., 0 d.	7	447	18·47	23·09
Butter Boy Keyes 2nd Lass....19686	6 y., 10 m., 0 d.	14	975	36·62	44·52
Canaan Beauty, 2nd.....21172	5 y., 2 m., 25 d.	7	559	16·13	20·17
Canaan Beauty 2nd.....21172	5 y., 2 m., 25 d.	30	2,292	62·71	78·39
Evergreen March 3rd.....12659	7 y., 11 m., 7 d.	7	504·5	16·94	21·17
Evergreen March 3rd.....12659	7 y., 11 m., 7 d.	30	2,131	68·14	85·17
Helena Keyes Posch.....21376	5 y., 6 m., 24 d.	7	689	18·55	23·19
Helena Keyes Posch.....21376	5 y., 6 m., 24 d.	14	1,335·5	36·70	45·87
Lulu Ormsby.....27288	4 y., 4 m., 11 d.	7	433	17·80	22·25
Lulu Ormsby.....27288	4 y., 4 m., 11 d.	30	1,857·5	67·00	83·75
May Echo Posch.....36074	4 y., 11 m., 0 d.	7	611·5	21·43	26·79
May Echo Posch.....36074	4 y., 11 m., 0 d.	30	2,542	85·10	106·38
Ottawa Bessie Ann.....27130	4 y., 5 m., 11 d.	7	536·5	18·54	23·17
Ottawa Bessie Ann.....27130	4 y., 5 m., 11 d.	30	2,202	73·12	91·40

SHEEP.

Although the lack of pasture is still a great hindrance in the investigational work with sheep, yet conditions have improved materially through the loan of grazing lands in the arboretum for which this Division is indebted to the Division of Botany. Breeding work with Shropshires and Leicesters has been continued most satisfactorily. The flocks have again increased in numbers and value, and there are now 199 head in the pens. Allowing full values on labour, feeds, purchases, and interest on investment, the sheep on this Farm have produced a net profit of $937 during the year.

No lines of experimental work were undertaken, aside from acquiring correct figures as to costs of rearing young stock and profits therefrom.

SWINE.

Another very successful year is to be reported for this department on this Farm. At present there are 216 head in the pens, composed of 158 Yorkshires and 58 Berkshires. This is an increase of 28 head over March 31, 1917. The quality also of both breeds has very materially improved during the year. Including sales $6,617.31, increased value of herds $2,411, and manure at only $1 per ton, this department shows a profit of $1,913.92 over feed, regular labour, extra labour for experiments and purchases.

Several lines of investigational work have been conducted; all, however, dealing with the possibility of increasing production with the limited feeds and labour available. These experiments were conducted under both winter and summer conditions.

Experiment No. 1, conducted to obtain information as to rations for weaning pigs, again showed skim-milk unexcelled as a supplement to a shorts, oats and corn ration. Tankage and fishmeal, although slightly inferior to, were excellent substitutes for, skim-milk.

Experiment No. 2, dealing with methods of feeding young pigs, showed greatest gains from the free use of the self-feeder in the creep from the age of four weeks.

Experiment No. 3, dealing with the value of clover pasture for growing hogs, showed the pasture for this year of a value sufficient to reduce the cost of production nearly 20 per cent as compared with a similar lot given the same feeds on dry lot. Gains on pasture were very rapid. This experiment also demonstrated the value of the self-feeder for hogs. Not only was over 50 per cent labour saved, but gains were made more rapidly, and the feeds consumed per pound of gain were only slightly greater.

Experiment No. 4 was a study of available feeds which might be used as substitutes for feeds such as middlings, barley, corn, etc., which owing to war or crop conditions, were off the market for the time being. This experiment dealt largely with the value of grade A elevator screenings (buckwheat screenings) as fed with some standard meals. Briefly, the findings of this trial are as follow:—

Buckwheat screenings and skim-milk fed to shoats weighing about 70 pounds produced the greatest gains per day, and the pigs were in better bloom and health than other lots. The gain, however, cost slightly more than some other lots, amounting in feed to 6·35 cents per pound.

Shorts and skim-milk produced the next largest gains per day and second greatest gains for meal consumed, and gains cost in feed only 5 cents per pound. However, the lack of bloom and the tendency toward crippling were evident, and pigs were not as marketable as any other lot.

Screenings and shorts, equal parts, with skim-milk stood fourth as to total gains, and third as to cheapest of gains, which cost in feed only 6 cents per pound. In this lot there was some tendency to crippling, but not as great as with those fed on shorts alone.

Screenings, linseed oil meal, and skim-milk produced 0·82 pound gain per pig per day, which cost in feed 5·65 cents per pound gain. This feed showed the greatest gain for meal consumed, but stood below shorts as to cheapness. However, the pigs were in good shape and showed no disposition to cripple.

Screenings, tai kage, and skim-milk showed less total gains, less gain for meal consumed and higher cost of production than where linseed oil meal was used. The thrift of the pigs, too, was not as good.

A mixture of barley, shorts, linseed oil meal, and skim-milk was less successful than any preceding feed in producing gains or profit.

This experiment clearly illustrates the excellence of elevator screenings as a feed for finishing hogs.

Exact information relative to the costs of breeding and rearing pigs has been obtained during the year. Results have shown that, even with present high labour and feed prices and high cost of breeding stock, there is yet a fair margin of profit in rearing pork.

BRANCH FARMS.

The writer, in addition to his duties at the Central Experimental Farm, has officially visited, at least once during the year, all the branch Farms and Stations in Canada where live-stock work is conducted or expected in the near future. It is the aim to assist the superintendents of these Farms to establish necessary herds and flocks and to organize and develop live-stock work in every way possible, so as to meet the immediate needs of Canadian farmers.

BUILDING PLANS.

The Animal Husbandry Division has again during the fiscal year furnished plans and specifications of proposed new live-stock buildings for branch Farms. Several of these plans, approved by the Director of Experimental Farms, have been used by the Department of Public Works in the construction of these buildings.

A large number, over 500, of plans and specifications of farm buildings have been sent free of charge to farmers throughout Canada, and many excellent barns have been constructed after these plans to the marked satisfaction of their owner.

MISCELLANEOUS.

The correspondence and other office work of this Division continue to make rapid growth.

The writer, as well as the staff of assistants, has spent a great deal of time attending a large number of meetings in various parts of Canada and assisting farmers to maintain and, where possible, increase animal production.

The duties of judging at numerous exhibitions, assisting at live-stock short courses, including the Ontario Judges' Course held on this Farm, and the studying of live-stock conditions and the needs for experimental and demonstrational work have received most careful attention.

DIVISION OF HORTICULTURE.

REPORT OF THE DOMINION HORTICULTURIST, W. T. MACOUN.

FRUITS.

While the fruit crop in 1917 was not as satisfactory at the Central Experimental Farm as in 1916, a fair crop of most kinds of fruit grown was harvested.

Although the apple scab was not as bad in this district as in the previous years, it would have done much injury at the Experimental Farm if the trees had not been kept thoroughly sprayed, but as a result of spraying there was little scab on the fruit as a whole.

It was a favourable season for European plums, and good crops of a number of varieties were gathered. Owing to the late season and cool autumn, few varieties of grapes ripened. Small fruits did well. It was a good season for most kinds of vegetables. The ornamental grounds were particularly attractive in 1917.

Apples.—There is at the Central Experimental Farm one of the best collections of varieties of apples in America, and certainly the best collection of the hardiest varieties. It is necessary to have such a collection at some place in Canada as fruit growers are constantly wanting varieties named. They are obliged to put the correct name of the variety on every closed package for export, and there must be some place where they can have varieties identified if they do not know them, and to be familiar with varieties one must see them frequently; hence the Horticultural Division is looked to for this information. Many samples were sent in for name in 1917. Detailed descriptions are made of the varieties which fruit at Ottawa, and those which cannot be grown there on account of being too tender are named from specimens obtained from other sources. Many new varieties fruit every year, both of those originated at Ottawa and elsewhere, and 1917 was no exception. Mention has been made from year to year of the new varieties originated in the Horticultural Division. A collection of these was shown at the Exhibition of the American Pomological Society held in Boston in October, 1917, and was awarded a Silver Wilder Medal, the highest award given by this society.

Plums.—Fruit growers in the colder parts of Canada, where European plums cannot be grown, are urged to grow the improved varieties of American plum, which are very hardy in fruit bud. Among the earliest and best varieties of these are the Cheney, Assiniboine and Mammoth, which, though suitable wherever these plums are grown, are particularly desirable for the districts where the season is short. Other good varieties, which need a longer season, are Brackett, Bixby, Admiral Schley, Surprise, and Terry. Two good, hardy, hybrid varieties are Emerald and Omaha.

Pears.—There are a few hardy and blight-resistant varieties of pear at Ottawa, such as the Kurskaya, Bessemianka, and Zuckerbirne, but these are all inferior in quality. Crossing was continued in 1917 between these and some of those of good quality, with the object of obtaining better sorts than those now available. A fine lot of young trees as a result of the work of previous years will be ready to plant out in 1918.

Cherries.—The ordinary sour cherries, even those of Russian origin, are not satisfactory at Ottawa, but a dwarf species from Northern Japan and Northern China called *Prunus tomentosa* gives promise of extending the area for cherries considerably northward. The fruit varies much in size, but is of good quality. Many seedlings are being grown for the purpose of obtaining, if possible, still larger fruit. These cherries fruited well in 1917.

Grapes.—Few varieties of grapes ripened in 1917 on account of the cool autumn, but it has been found that there are a few sorts of the European grape which are earlier in cool seasons than any of those of American origin. The names of two which are particularly early are Pearl of Csaba and Bonne Madame.

Currants.—The black currants originated by the late Dr. Wm. Saunders continue to be the most productive varieties grown. Some of the best of these are Climax, Kerry, Clipper, Magnus, and Saunders.

Raspberries.—The Herbert raspberry has done better than any other at Ottawa; Cuthbert, the standard sort in the warmer parts of Canada, not being so hardy. A promising new sort is the Newman No. 23, originated by C. P. Newman, Highlands, Que.

Gooseberries.—While the English gooseberries do well in some private gardens in Ontario, when grown in the open they are very subject to mildew, and although many sorts have been tested at the Experimental Farm, none has proved entirely satisfactory, even with spraying. The chief dependence is still on Downing, Pearl and Josselyn or Red Jacket. Oregon Champion does well in some districts, particularly in British Columbia, and should be tried. Houghton is the most satisfactory for the prairies.

Strawberries.—Such a large number of persons in Canada are interested in strawberries that they have always been a prominent feature of the horticultural work. Experiments in methods of cultivation have been tried, but the matted row system has been found the most satisfactory for the colder parts of Canada. There is usually more or less winter-killing, but, as a rule, there are enough plants left in the matted row system to ensure a fair to good crop. The varieties which have succeeded best at Ottawa over a long period are:

Early: Bederwood, per.; Splendid, per.

Medium Early: Greenville, imp.; Pocomoke, per.; Senator Dunlap, per.

Medium to Late: Parson Beauty, per.; Buster, imp.; Sample, imp.; Glen Mary, per.

Wm. Belt is a good late variety for home use, and Senator Dunlap is one of the hardiest and most satisfactory on the prairies. Progressive has proved to be the most satisfactory "everbearing" variety at Ottawa. Two very promising sorts originated at the Central Farm are Portia and Valeria, both especially suited for the home garden.

VEGETABLES.

In 1917 especial attention was again paid to experiments in growing vegetable seeds. Beets, carrots, parsnips, cabbage and celery were successfully wintered outside, as in 1916, and the yield of seed was good. From plants grown on small areas the following yields of seed per plant have been obtained: Beets 2½ to 5½ oz., cabbage 2 to 5 oz., carrots 1½ to 2½ oz., celery 1 to 2½ oz., onions ¼ to ½ oz., parsnip 2 to 4 oz.; and the yield per plant of some of the annual vegetables not usually grown from seed are: lettuce ¼ oz. per plant; radish 1 oz. per plant; spinach 1¾ oz. per plant. It is planned to grow larger areas in 1918 on most of the Experimental Farms and Stations, and the yield from those will give a better idea of what yield per acre might be expected when grown on a commercial scale. It has been found by experience that home-grown seed is quite as good or better than that grown in other countries. In view of the possible shortage of seed of some kinds of vegetables in 1919, and because of the ease with which the private individual can grow enough seed for his own use, a circular was published in the winter of 1917-18 entitled, "Every Gardener His Own Seed Grower," in which those who had roots in their cellar were urged to save a few of each kind of vegetable and plant them in the spring of 1918. Directions were given for growing the plants and saving the seed.

The great superiority of seed potatoes from the parts of Canada having relatively cool summers was again shown in a comparison at Ottawa of seed stocks from different districts. The total yield per acre of Green Mountain potatoes from seed from Port Arthur, Ont., was 400 bushels 24 pounds per acre; from Fredericton, N.B., 341 bushels per acre; and from Ottawa seed 85 bushels 48 pounds per acre. The advantage of early planting in eastern Ontario was again shown. Green Mountain potatoes planted on May 12, 1917, yielded at the rate of 352 bushels per acre, and on May 26, about the date they are commonly planted, 295 bushels per acre. The desirability of sprouting potatoes in the light for several weeks before planting was shown by the yield obtained. Irish Cobbler, sprouted, yielded at the rate of 227 bushels per acre, and unsprouted, 164 bushels per acre. Crines Lightning, sprouted, yielded at the rate of 563 bushels per acre; and unsprouted, 354 bushels per acre. While the latter variety outyielded the Irish Cobbler, it was due mainly to the superior vitality of the seed of the Crines Lightning, rather than to the variety itself.

As there was great interest shown in 1917 in a newspaper article describing the very large yields said to have been obtained by growing potatoes in crates or pens, this method was tried at Ottawa, but the yields were very disappointing. From a crate 8 x 6 x 6 feet in size a crop of 81 pounds 4 ounces of marketable, and 12 pounds 4 ounces of unmarketable potatoes was harvested. The amount of seed used was 42 pounds marketable potatoes.

The development of earlier and better strains of different kinds of vegetables is an important feature of the work of the Horticultural Division. The Alacrity tomato and Early Malcolm corn are now in the trade, and are eagerly sought for. The Squaw corn, which is especially early, has been crossed with varieties of sweet corn, and promising new sorts have been obtained and are being selected. Attention is being paid to the improvement of beans, peas, onions, and other vegetables, and work in selecting new strains of tomatoes was continued in 1917.

Flowers.—Notwithstanding the war, it has been felt that some flowers should be grown, and during the season of 1917 there was a good display of annuals, especial attention being given to asters and sweet peas, which are two of the most popular flowers. The rose garden looked well, and attracted many visitors. Very fine strains of columbine are being developed by selection and cross-breeding, and these bloomed profusely. In the greenhouses the new varieties of geraniums originated at the Experimental Farm attracted much attention, while the chrysanthemums drew crowds of people.

Vegetables in Greenhouses.—Special attention was paid to vegetables in the greenhouses in 1917, experiments being tried with beans, cucumbers, tomatoes, melons, and lettuce. It had been found in 1916 that the Hodson Wax bean became a climbing bean when given wire support. Hence in August, 1917, a whole house was planted to this variety and a wire trellis put up for the plants to climb on, with the result that they grew to a height of 5 feet, of which 3½ feet bore beans. There was about two and one-half times the crop from the Hodson Wax grown on the trellis as when it was grown without. A test of Hodson Wax and other dwarf varieties was made during the winter months, the seed being sown on December 13, 1917, to determine if other sorts would climb, but they did not to any extent, although they gave indications that they might if grown at a more favourable season. Hodson Wax only reached a height of 29 inches in this test. The heaviest yielding varieties were Masterpiece, May Queen, Plentiful French, Sutton Plentiful, Dwarf French Excelsior, Long Pod Forcer, all of which yielded nearly the same and most of which were very similar in appearance.

A crop of head lettuce was grown very successfully in one of the greenhouses during the winter of 1917-18. Twenty-three varieties and strains were compared. The most promising were Sutton Golden Ball, Veitch Golden Queen, very similar to the last, Sutton Earliest of All and Early Paris Market. The Boston Market and others

very similar, while succeeding well, were longer in developing, and in a cold climate where considerable fuel is necessary to keep the houses even at the low temperature required for lettuce, it is important to have the crop mature as soon as possible.

CANNING EXPERIMENTS AND DEMONSTRATIONS.

As the canning of fruits and vegetables is a very important occupation during war-time, a special effort was made to assist housewives in this work, and to encourage those to can produce who had not done so before. Hence a young lady trained in domestic science was employed for several months to experiment in methods of canning and to try different canning outfits. The work was very successfully done, and a number of demonstrations in canning were held which were attended by many people. Demonstrations were carried on at the Central Canada Fair, where very many watched the operations. A pamphlet on canning was prepared for the Food Controller's office by the Horticultural Division, and was widely distributed.

The correspondence during the year was particularly heavy, as very many people throughout Canada have become interested in horticulture since the war began. Much information was given to these people by letter and thousands of bulletins, pamphlets and circulars were distributed. Owing to the great interest in regard to potatoes, an exhaustive bulletin on this crop was published during this year, giving the results of experiments. A popular edition of this was also issued.

THE CEREAL DIVISION.

REPORT OF THE DOMINION CEREALIST, CHAS. E. SAUNDERS, B.A., Ph.D.

THE SEASON.

The spring of 1917 throughout large sections of Canada was remarkable for the unusual lateness of seeding. In the West, seeding did not become general until the first week in May. In northern and central Ontario, and in most parts of Quebec, little was done before the 10th of May, while in the Maritime Provinces, and especially in New Brunswick, operations were delayed until the middle or towards the end of the month. Had it not been for unusually favourable weather conditions immediately following this period, the late seeding, more particularly in the West, might have been disastrous. During the growing season, there was a long period of severe drought over the larger part of Alberta and Saskatchewan. Manitoba was considerably less affected. In Eastern Canada, June was a particularly cool month, and growth was slow. Some of the late-sown grain was injured.

These various unfortunate conditions reduced the yields of cereals in all the provinces. In quality, however, the grain compared favourably with previous seasons, wheat in particular being of unusually high grade. Barley was of medium quality but oats suffered a good deal from various untoward seasonal conditions.

NEW VARIETIES OF CEREALS.

Two new cross-bred varieties of cereals from among the very large number under test at Ottawa, have been named and introduced this past winter. One of these is an early ripening spring wheat, and the other an early ripening hulless oat.

The new wheat, which has been named Ruby, Ottawa 623, was formerly recorded as 623B. It is a selection made from the progeny of a cross between Downy Riga and Red Fife. This cross was effected by the Dominion Cerealist in the year 1905, a selected strain of Downy Riga (Downy Riga G) and a selected strain of Red Fife

(Red Fife H, since named Red Fife, Ottawa 17) being employed. Downy Riga was produced many years ago at the Central Experimental Farm by crossing two early sorts: Gehun, an Indian variety of extremely early ripening habit, and Onega, a wheat from Northern Russia. The following are the striking characteristics of Ruby wheat: it ripens a week or more, as a rule, before Marquis, and a few days after Prelude. The kernels are somewhat similar to those of Red Fife, being hard and of the popular reddish-brown colour. The heads are beardless. The straw, in most localities, is rather shorter than Marquis, but of good strength. It is not expected that Ruby will resist wind quite as well as Marquis, but, on the other hand, it will be easier to thresh. Ruby produces flour of excellent colour and high baking strength. As for yield, the experiments which have thus far been carried on indicate that Ruby will stand in yield as it does in earliness; between Prelude and Marquis. Prelude yields approximately seven-eighths as much as Marquis, under conditions favourable to the latter, and Ruby may be expected to do distinctly better than this. It is not, however, recommended as a substitute for Marquis in those districts where Marquis is quite satisfactory, but, for localities where Marquis cannot be depended on to ripen in good time, Ruby is confidently recommended as the best extra-early wheat known at present. A limited, special distribution of this wheat has been carried on this spring, and arrangements have been made for a larger distribution next season.

The new oat has been named "Liberty, Ottawa 480". Its previous designation was 480 L. This is a selection made from among the progeny of a cross effected by the Dominion Cerealist in the year 1903 between the Chinese Naked variety and the Swedish Select. Liberty is decidedly early in ripening, and stands up exceptionally well. It yields (so far as can be definitely stated from the figures available) about seven-eighths as much as Banner, when allowance is made for the hull of the latter. Obviously, this new oat is not recommended as a variety to take the place of the standard sorts which retain their hull. It will, however, be of very great value for certain special uses. As it gives up its hull in the threshing machine, it should occupy a very important position in the feeding of young pigs and young chickens. For houshold use, especially in outlying districts, it will also be very valuable. By passing the threshed grain once or twice through the fanning mill, a product is obtained pure enough for grinding in any ordinary hand or power mill for household uses. The oatmeal so produced is of exceptionally fine quality, and gives porridge and oat cake superior (in the opinion of almost every one who has tested them) to any of the oat products now on the market. The Liberty oat is strongly recommended to the consideration of farmers in almost all sections of Canada. The Cerealist believes that it would be advantageous for most of them to grow a couple of acres annually of this variety for use on their farms. Only a very small number of samples could be sent out this winter, but it is hoped that next year there will be a considerable quantity for free distribution.

DISTRIBUTION OF SAMPLES OF SEED GRAIN.

The usual annual, free distribution of four-pound and five-pound samples of seed grain has been carried on. At the time of writing, this distribution is not quite finished.

This year, in order to make a more equitable distribution than in the past, a definite number of samples was allotted to each province and, when sufficient applications for those samples had been received, no more were accepted. By the adoption of this plan, it is hoped that the exceptionally good seed which is sent out from here will do more good than in the past, by being more evenly distributed to the whole of Canada. The supply of seed for the distribution this year was furnished by the following Experimental Farms: Indian Head, Sask., Brandon, Man., Cap Rouge, Que., Ste. Anne de la Pocatière, Que., and the Central Experimental Farm at Ottawa.

TESTS OF VARIETIES OF CEREALS.

On the whole, good results were obtained on the test plots of cereals at nearly all the branch Experimental Farms and Stations as well as at Ottawa. In some instances, exceptionally unfavourable weather conditions reduced the value of the tests, but valuable information was obtained at almost every location. Harvesting conditions were more favourable than usual at Ottawa and the plots were brought in in exceptionally good condition.

GRAIN PLOTS AT OTTAWA.

Owing to the large increase in the number of new cross-bred and selected varieties and strains under test, it was found necessary to reduce the size of the plots from 1/60 to 1/120 acre. This change was not made without due consideration and is deeply to be regretted. The land available, however, is so limited that there was no choice between the reduction in size of the plots and the omission of a number of varieties each year, as has been the practice for several years past. The latter method, however, seems of the two the less desirable for meeting the difficulty and, in the future, it is intended to sow every variety every year, no matter how small the plots may have to be. In the regular test plots, there were 302 varieties and strains of wheat, 19 varieties of emmer and spelt, 322 varieties and strains of barley, 17 varieties and strains of flax, 51 of beans, 75 of buckwheat, and 65 of peas.

Of the usual very small plots of unfixed varieties and of varieties and strains in the first stages of propagation, there were as follows: 822 small lots not fixed, 103 strains in small lots for propagation.

The total number of plots of all sizes was 1,776.

MILLING AND BAKING RESEARCHES.

The milling and baking researches were resumed in December on the appointment of a new assistant. The usual tests of the new cross-bred and selected varieties of wheat produced at Ottawa always occupy much of the time, but some attention was also given this winter to investigations dealing with unusual problems in breadmaking which have arisen on account of war conditions. The quality of flour produced from good milling wheat when the percentage of extraction is considerably higher than usual was investigated and it was found that excellent bread could be made when as high as 85 per cent of flour was obtained from the wheat. Mixtures of wheat flour with flour from other cereals were also baked, the results showing that with good, strong wheat flour the addition of 10 per cent or more of foreign flour from any other cereals does not prevent the production of excellent bread. This winter, 105 samples of wheat have been milled, and 200 test loaves have been baked up to the present date.

Tests of the cooking qualities of peas have also been carried on in order to ascertain the suitability for soup-making of the different varieties, as well as to discover, if possible, the influence of climate and soil. These experiments have not proceeded far enough to enable one to draw any definite conclusions. About thirty tests of samples of peas were also made for the Department of Naval Service.

DIVISION OF BOTANY.

REPORT OF THE ACTING DOMINION BOTANIST, J. H. GRISDALE, B. AGR.

The work on the White Pine Blister Rust was carried on in 1917 with a special appropriation under the Destructive Insect and Pest Act in co-operation with the Forestry Department of the province of Ontario.

A short summary is given herewith of several of the more important features of the work carried out during the summer.

Examination of plantations of imported pines scattered throughout the province was carried on. The inspection covered 123 plantations, aggregating some 156,227 trees. The disease was again found on three plantations where it had occurred last year, but the only new infection occurred at Ancona Point near Lindsay.

Considerable attention was given early in the year to the known danger points, in the hope that if the disease was located early in the season it might be stamped out without much labour or expense. As the season advanced, the rust appeared on currants in such a widespread fashion that further attempts at suppression in these localities appeared useless.

The establishment of a neutral zone along the Niagara river was carried out in conjunction with the New York State authorities. In order to prevent the disease from spreading across the international boundary, all wild and cultivated Ribes were removed from a strip one mile wide on each side of the river.

During August and September, the inspectors scouted for the currant stage of the rust. An appeal was made to the public schools for assistance. From both sources of information it was found that the rust was present in 38 out of the 43 counties, or in about 120 out of 455 townships in these counties.

The results of this summer's work enable one to see clearly that the disease has now secured such a foothold in the province that further efforts to suppress it would be useless, and that the only hope for the future pine forests lies in local protection wherever this is possible.

As in the province of Ontario, the department, in co-operation with the Forestry Service of the province of Quebec, established the wide prevalence of the disease in Quebec province.

From the general distribution in Eastern Canada of the rust stage on currants, it is evident that certain provincial legislation will become necessary at an early date excluding from shipment to and from certain areas within both provinces all five-leaved pines and certain currant nursery stock.

The usual appropriation under the Destructive Insect and Pest Act enables the Division to conduct an inspection of potato fields and crops, which is carried on with a view to improving the seed supply of this important commodity. By these means it is hoped eventually to combat the considerable depreciation in yield due to such obscure diseases as leaf roll, curly dwarf, and mosaic. None of these diseases can be recognized in the seed itself, whereas it is an easy matter to deal with them in the fields. This work, formerly confined to the Maritime Provinces and Quebec, is now being extended to Ontario, where it has aroused considerable interest.

The preparation of nitro-culture, which was commenced for experimental purposes within the Experimental Farm system, is being continued. The importance of mixed farming in Canada increases the interest in growing leguminous crops, particularly alfalfa, and everything possible is done to encourage the widest use of these useful crops. For this reason, sample cultures were distributed to a limited extent to farmers who experienced difficulties in establishing or, indeed, total failures in raising, these crops. The treatment of these seeds with pure cultures is in many cases as important as the sowing itself, and results of remarkable interest were obtained from their use.

During the year, 230 cultures of alfalfa, 80 of red clover, 18 of alsike, 156 of peas, and 26 of beans were sent out. All of these were from original isolations, with the exception of the bean cultures, which were courteously placed at the disposal of the Division by Macdonald College, Que.

From the use of pea cultures on land previously never used for peas, the yield was increased two bushels per acre over a crop not treated. Similar reports have been received on red clover and alfalfa. Over one-half of the total number distributed went to the western provinces.

Mr. John Adams, M.A., in charge of economic botany, dealt with the identification of plants, of which every year a considerable number are sent in from all over the Dominion. The usual exchange of seeds collected in the Arboretum and Botanical Gardens at Ottawa was again carried on with a number of similar institutions in other countries. During a collection trip through the West, numerous seeds of western wild plants were collected and are now being raised in Ottawa. The herbarium collection of the Division received certain additions.

Experimental plots were planted with opium poppy, castor oil, and sunflower, and several species of plants recommended for fibre were also tested. In the absence of a Canadian flora, attention is being given to the compilation of a reference list, including all plants occurring wild in Canada. This will materially assist in saving time in the identification of Canadian plants.

The time of another assistant was devoted to the preparation of the manuscript and illustrations for a bulletin on the principal poisonous plants of Canada.

During the year a number of press articles were prepared, as well as several special circulars and pamphlets. Early in the year the manuscript of a bulletin on Black Stem Rust of Wheat to accompany the coloured poster previously published, was prepared, and appeared in print during the summer.

FIELD LABORATORIES.

The following is a brief résumé of the work carried on under the direction of the Division of Botany at the various field laboratories devoted to the study of plant diseases.

St. Catharines, Ont.—The officer stationed at this laboratory was placed in charge of the White Pine Blister Rust work, and considerable time was spent in carrying out the program referred to elsewhere in this report.

Among other investigations may be mentioned a preliminary study of a strawberry root disease, which appears rather widespread. Progress was also made with Peach Heart rot. The investigations into the cause and control of Peach Canker were concluded, and a bulletin was prepared on the subject. An account of the most common tomato diseases was also prepared during the year, which will appear in bulletin form.

During August of 1917, this laboratory assisted, as far as other duties would permit, in making a survey of the potato situation, especially as it related to northern Ontario. This survey disclosed that, in general, Northern Ontario potatoes are somewhat freer from disease than those grown in the southern part of the province, and it is planned by the provincial authorities to use the northern areas as a source for seed for the rest of Ontario.

A series of sixteen lectures on plant diseases were given throughout the fall and winter, mainly to agricultural classes, farmers' clubs and farmers' institutes, and two weeks were spent with the Better Farming Special in the eastern sections of Ontario in November and December.

Charlottetown, P.E.I.—The principal investigations dealt with at this branch laboratory related to a study of various diseases affecting potatoes, turnips, wheat, beans, apples, cherries, and tomatoes. Potato spraying experiments for Late Blight

established the fact that not less than four applications per season are necessary, though not quite as effective as five or six applications in controlling this disease. Bordeaux mixture composed of 4 pounds of bluestone and 4 pounds of lime to 40 gallons of water appears the most efficient and economical spray to use. Horse-power spraying machines with two or three nozzles to each row, gave more than double the increase in yield that sprayers with one nozzle to each row did. Sprayers with one nozzle to each row gave more than three and one-half times as large an increase when the field was sprayed four times twice over in opposite directions, as when only four single applications were made.

For the control of the Black Leg disease of potatoes, experiments confirmed that the whole tuber should be treated with disinfectants and not the cut tuber. The disease apparently is not carried over in the soil. The study of Curly Dwarf, Leaf Roll, and Mosaic disease of potatoes has been continued. The control of these diseases is still a matter on which considerably more information is required. Arrangements have been made for raising a stock of seed of the turnip variety "Jumbo", resistant to Club Root.

The usual field inspection of potatoes and survey work were carried out. Garnet Chili districts affected with Leaf Roll in Nova Scotia have been thoroughly cleaned up with very satisfactory results. In Prince Edward Island some sections are now going into the business of growing Irish Cobblers for seed as a result of the work of the Division. This should provide a good outlet for potatoes in spring, when prices are always low in that province.

Success attended the efforts to introduce potato spraying. Fourteen horse-power sprayers costing from $115 to $150 each were purchased by co-operative spraying clubs in Prince Edward Island and Nova Scotia, and more than 500 acres of potatoes were sprayed for the first time with most satisfactory results.

Fredericton, N.B.—The officer in charge arranged for a series of potato-spraying tests to be carried on to determine the increase in yield due to freedom from blight, the number of applications necessary, and to demonstrate to the farmers in general the value of spraying as one of the essential features in growing potatoes. This work, now carried on for several seasons, appears to have met with gratifying success; the farmers, it is said, now realize that spraying is just as important as thorough cultivation or proper fertilizing of the soil.

An experiment on a large scale aiming at the comparison of yields of potatoes of the same variety but grown at various points, showed that a wide variation existed. This will eventually lead to the elimination of poor-yielding stock as the results become known. The lowest yielding sample of Green Mountain gave 71 bushels per acre, while the highest gave 258 bushels under the same conditions. In some localities there were obtained as many as 348 bushels per acre from this variety. This experiment will show prominently the necessity for a change of seed where poor fields are the rule.

Observations were also made on certain constitutional diseases of the potato, among which are grouped Leaf Roll, Mosaic, Leaf Streak, Spindling Sprout, and Internal Brown Streak.

Brandon and Indian Head Laboratories.—The study of grain rust and other cereal diseases was begun in the spring of 1917, with field laboratories at Brandon and Indian Head. The work during this first summer was largely of the nature of a field survey with the object of gaining information on the origin of the stem rust and the conditions that influence its spread and development. In the early part of the season some time was given to a study of the extent and severity of the epidemic of 1916.

The following principal problems received attention:—

What native and cultivated grasses are attacked and what part do they play in the hibernation and distribution of the rust?

The species of rusts attacking cereals in Western Canada and the extent of the injury caused by each species.

The origin of the outbreaks of rust—Do the summer spores of the rust live over the winter in straw or stubble of grain fields and attack the growing wheat, or does it survive the winter in the form of mycelium or spores in the perennial grasses and pass from there to wheat, or do epidemics arise from spores carried by the wind from wheat fields further south?

The location of the rust-bearing barberries and their rôle in the spread of rust.

Some time was also devoted to a survey of the extent and injury caused by other cereal diseases.

During the winter, infection experiments were conducted in the greenhouse to determine the strains or biologic forms of the stem rust (*Puccinia graminis*) that occur in Western Canada, and the grasses attacked by these strains.

The rust problem is a wide and difficult one, and needs the co-operation of many investigators. The universities, agricultural colleges, and Experimental Farms generously assisted in many ways during the season, and this assistance is gratefully acknowledged. Plans for close co-operation were outlined at a conference of representatives from these institutions and the Division of Botany, held at Winnipeg in August. It is hoped that these plans will be carried out in the near future. Such co-operation should lead to important results.

DIVISION OF BEES.

REPORT OF THE APIARIST, F. W. L. SLADEN.

For Canada as a whole, the production of honey per colony in 1917 was below the average, although the crop in the important producing region of southern Ontario almost reached the average, and the lower mainland of British Columbia welcomed a good season after two poor seasons. The price of extracted honey rose rapidly during the latter part of the summer, and the rise continued after most of the crop had left the hands of the producers.

Bees were kept at sixteen of the Experimental Farms during the year. The following table gives a summary of the average production of each apiary since the year 1913:—

Farm.	Period.	Average Annual Weight of Honey, produced. per colony, Spring Count.	Value of Production per Colony, Honey and Bees, after deducting Winter Loss.
Charlottetown, P.E.I.	5 years, 1913–17	23·1 lbs.	$ 1 51
Nappan, N.S.	5 years, 1913–17	102·2 lbs.	13 41
Kentville, N.S.	4 years, 1914–17	49·1 lbs.	6 80
Fredericton, N.B.	4 years, 1914–17	45·5 lbs.	7 33
Ste. Anne, Que.	4 years, 1913–16	62·5 lbs.	11 44
Cap Rouge, Que.	5 years, 1913–17	56·8 lbs.	8 02
Ottawa, Ont.	5 years, 1913–17	106·7 lbs.	14 76
Brandon, Man.	5 years, 1913–17	25·7 lbs.	6 28
Morden, Man.	1 year, 1917	28·0 lbs.	6 90
Indian Head, Sask.	3 years, 1915–17	39·8 lbs.	11 33
Lethbridge, Alta.	3 years, 1914–16	86·6 lbs.	18 31
Lacombe, Alta.	3 years, 1915–17	41·8 lbs.	8 37
Invermere, B.C.	4 years, 1914–17	58·4 lbs.	9 31
Summerland, B.C.	2 years, 1916–17	44·5 lbs.	9 38
Agassiz, B.C.	4 years, 1914–17	33·5 lbs.	4 58
Sidney, B.C.	4 years, 1914–17	21·8 lbs.	3 00

Alsike and white clover were the principal sources of honey at all the Farms except Lethbridge, where it came from alfalfa, which also gave much of the yield at Summerland.

The value of these figures as a guide to what may be expected in the surrounding country is affected by the following factors. At Ottawa the yield was increased by white sweet clover growing in vacant lots, and at Indian Head by hedges of *Caragana* that are extensively planted at this Farm. At Cap Rouge, Agassiz, and Sidney the nearness of large areas of river, mountain and sea, respectively, reduced the available bee forage. At Brandon, the apiary was used for a while for breeding bees to supply the western Farms. All the apiaries, except Ste. Anne, Ottawa, and Invermere, were in charge of untrained men for a considerable part of the period; Charlottetown was the greatest loser from this cause. The increasing acreage of special crops is gradually making the conditions on many of the larger farms less representative of the regions they serve.

The general conclusion to be drawn from these figures is that bees can be kept with profit in the regions served by all the above Farms, and that Eastern Canada offers better opportunities than the West.

In the summer of 1917, the writer continued his survey of Canada for favourable regions for abundant honey production, visiting, among other places, the Rainy River and Kenora districts in Ontario, and the Lake St. John district in Quebec. The prospects for commercial beekeeping around Dryden in the Kenora district are bright, and the Lake St. John district produces clover honey of the finest quality, the absence of inferior honey being a helpful factor in wintering the bees.

Co-operative experiments with experienced beekeepers in typical localities for honey production were continued and extended. These included East Royalty, P.E.I.; Gaspereau, N.S.; Amherst, N.S.; Louiseville, Que.; Montcerf, Que.; Lytton, Que.; Athens, Ont.; Thornloe, Ont.; Clandeboye, Man.; and Medicine Hat, Alta. All these places, except East Royalty and Athens, were visited by the writer in the summer of 1917. Much valuable information is being obtained from this work.

Experiments with fireweed (*Epilobium angustifolium*), the most promising honey plant for commercial beekeeping at altitudes and latitudes higher than those at which clover gives best results, have been started.

Experiments in importing young bees in spring without combs from the Southern States were conducted at Ottawa. It was found that three 2-pound lots received from Alabama on May 9, about a week before the commencement of the honey flow from dandelion, costing $3.66 each including express charges, after being supplied with empty combs produced an average of 105·3 pounds of extracted honey, valued at $15.75, which was about as much as that produced by the regular wintered colonies. Another shipment received on May 27 produced an average of only 18 pounds of honey per lot, which showed the advantage of obtaining the bees at the earlier date.

Experiments having for their object the reduction of labour in the control of swarming, and the reduction in the mortality of bees in the winter, the two greatest problems of bee management in Canada, have been continued. Sealed covers and a northern aspect were again found to produce good results in wintering bees outside, four colonies in a case, in the well protected yard at the Central Farm.

At the Experimental Farm, Ottawa, 2,931 pounds of honey of the usual good quality were obtained from twenty-seven colonies, spring count, an average of 108·5 pounds to the colony, and twelve colonies were sold. The value of honey and bees produced at Ottawa, less sugar fed and colonies lost in winter, was $14.50 per colony, spring count.

Bees were again placed for the summer on the sandy plain at Kazubazua, Que., and in the vicinity of swamps at Sully, Que., in order to continue the investigation of honey production in similar locations in Eastern Canada and of out-apiary management, more particularly in its relation to the control of swarming. The two

colonies at Kazubazua produced an average of 109 pounds of honey each, and the two at Sully 139 pounds each. The honey was of fair quality, and came from blueberry, pin-cherry, dandelion, raspberry, white clover, alsike, fireweed, and various species of goldenrod. Although abundant room and ventilation were given in the hives, it was found necessary to visit the bees each week from May 24 until August 14 in order to prevent the loss of swarms, queen-cells being found and cut out of one or both of the hives at Kazubazua every week until July 28 and at Sully until August 14.

An attractive and inexpensive paper container for granulated honey that has been devised at the Central Experimental Farm, Ottawa, to meet the increased cost and scarcity of tin containers was tested and found satisfactory. A part of the honey produced at Ottawa was put up in 2-pound and 5-pound sizes of these containers, and easy methods of filling and packing them were developed.

The growing importance of honey as a food, and the much higher price it now commands, have brought an increased number of inquiries about beekeeping and a heavy demand for the bulletin No. 26 (Second Series), "Bees and How to Keep Them." A number of articles on beekeeping, showing how honey production may be increased, etc., have been prepared and published in the beekeeping and general press.

DIVISION OF FORAGE PLANTS.

REPORT OF THE DOMINION AGROSTOLOGIST, M. O. MALTE, PH.D.

The work of the Division of Forage Plants was carried out along the main lines indicated in previous reports. A great number of varieties of field roots and Indian corn were tested as usual for the purpose of ascertaining their comparative value in different parts of the Dominion. Breeding work with grasses and clovers was continued although, on account of extra work in connection with root seed raising as an emergency measure being added to the normal scope of work, it had by necessity to be somewhat curtailed. Experiments in root seed production, carried on since 1914, were again conducted and yielded most interesting results. The same may also be said of some experiments with grasses and clovers started in 1916 with a view of ascertaining what cultural methods are likely to produce most remunerative seed crops.

VARIETY TESTS.

During the year, a total of 109 varieties of field roots were tested at the Central Experimental Farm, including 48 varieties of swede turnips, 13 varieties of fall turnips, 31 varieties of mangels, 14 varieties of carrots, and 3 varieties of sugar beets. Twenty varieties of Indian corn were also tested.

The yields of the field-root varieties were, on the whole, low, as is evidenced by their average yields per acre:—

	Average.	
	Tons.	Lb.
Swede turnips	18	198
Fall turnips	9	1,581
Mangels	17	1,665
Carrots	20	29
Sugar beets	9	1,583

With special reference to the general quality of the field root varieties tested in 1916, it was reported (Experimental Farm Report for the year ending March 31, 1917, page 45) that the variety tests decidedly indicated "that the seed available commercially . . . . was generally speaking, somewhat inferior to that of previous years."

The signs of deterioration in the general quality of the field-root varieties, which were observed in 1916, were still more pronounced in this year's variety tests. Practically all varieties secured commercially were greatly lacking in uniformity.

This lack of uniformity, which, of course, signifies degeneration of type and a lowered standard of quality in general, was particularly conspicuous in the mangel varieties. In fact, most of the mangel varieties tested were so badly off type that, in a variety, it was difficult to find even a small percentage of roots that could claim to represent the true type of the real variety in question. This deterioration in type and lack of uniformity in general was also quite apparent in the carrot varieties and, to a less degree, in the swede and the fall turnips.

In view of this, it seems only reasonable to conclude that the figures secured this year for the purpose of determining the yielding capacity per acre of the different varieties are of rather doubtful value. This applies especially to the mangel varieties in which, as pointed out above, the lack of trueness to type was most conspicuous.

FIELD ROOT SEED GROWING.

During the last few years, experiments have been carried out for the purpose of ascertaining the possibilities of raising seed of field roots advantageously in Canada. The experiments, which have been conducted at the Central Experimental Farm at Ottawa and also at various branch Farms and Stations in Eastern Canada and in British Columbia, have, so far, given most gratifying results. Not only have the experiments proved that it is possible to raise heavy crops in the Dominion, but they have also shown that seed, raised in Canada, is at least equal, if not superior, to any seed imported from other countries. That high-class seed of field roots, capable of producing at least as good root crops as any seed imported from foreign countries, can be raised in Canada, has been emphasized in previous reports, but attention may again be called to it in the hope that a realization of the possibilities of providing at home for a seed supply that will make the farmer independent of imports from abroad may stimulate the interest in root seed growing.

Factors Influencing Yields.—During the last three years the Division has conducted some experiments in an endeavour to arrive at definite conclusions as to how cultural methods and soil conditions influence the seed yield. The Division has found, as a result of investigations that however are not yet finished, that the yield of seed per acre is largely determined by two chief factors, viz.:—

1. Time of planting the seed roots in the spring, and
2. State of fertility of the soil.

Experiments conducted in 1915 and 1916 most decidedly indicate that the earlier the seed roots are set out, the heavier are the seed crops realized. Earliest possible planting of the seed roots may therefore safely be recommended. A few degrees of frost, after the roots have been planted, do not in the slightest way injure the seed roots. As a matter of fact, early planting in cool soil is preferable to later planting in soil that is warm, especially when the roots at time of planting are somewhat lacking in crispness.

With regard to the influence of the state of fertility of the land on root-seed crops, some illuminating data have been collected. An experiment, conducted on a rather small scale in 1915, indicated that a heavy application of manure or an application of a complete fertilizer very much increased the yield. The experiment was repeated and somewhat extended this year, different rates and combinations of artificial fertilizers being applied without manure, and also with manure at different rates per acre. The results which, however, are of a preliminary nature, clearly indicate that the land, in order to yield the heaviest possible seed crops, should be heavily manured and, in addition, be given a reasonably liberal dressing of a complete artificial fertilizer.

The Root Seed Supply.—On account of a reported shortage in the field root seed supply, the Division was requested, at the end of June, to take immediate steps to provide for certain quantities of mangel, swede turnip, and carrot seed being raised.

Accordingly, the necessary acreage for steckling growing was secured, largely by renting of land adjoining Experimental Farms and Stations. On account of the late seeding, and also on account of unfavourable weather conditions during the summer, the steckling crop on the whole did not develop as satisfactorily as it would have done, had the weather been more like normal and the seed sown earlier. The very unfavourable weather conditions that prevailed in Eastern Canada in general during the late fall also made harvesting somewhat difficult and, as a result, the stecklings when put in storage were not in the very best condition for satisfactory wintering.

In connection with the providing of an emergency seed supply, it may be again stated that, ever since the war started, the Division has realized that good seed might become rather scarce should the war continue for any length of time. In order to meet the demand for good seed, in case of serious shortage, the Division has arranged, since 1915, to have available certain quantities of as good seed as possible. For this purpose, improvement work through selection from commercial varieties has been conducted the last few years and, as a result, the Division had available, at the end of the season, considerable quantities of seed of various improved varieties, which may be used to advantage as " stock seed " for seed raising on a large scale.

GRASSES AND CLOVERS.

Breeding.—Unfavourable weather conditions during the plant breeding season, and the necessity of paying special attention to field root seed production as an emergency war measure, caused some curtailment in the breeding work. However, necessary operations for the propagation of the new varieties of timothy, alfalfa, western rye grass, and other forage plants that the Division is developing were carried through, although on a somewhat reduced scale.

Alfalfa, Clover, and Grass Seed Raising.—Most of the seed of leguminous forage plants and grasses produced in Canada is harvested from ordinary hay fields, that is to say from fields seeded down primarily for hay. Under these circumstances, seed growing of the said forage plants is a matter of secondary consideration; whether a given field is to be reserved for hay or for seed will largely depend on whether a hay crop or a seed crop promises to be more remunerative. Growing grasses and clovers exclusively for seed is not practised to any extent in Canada so far.

In order to secure some preliminary data on what cultural methods are likely to favour heaviest seed yields of grasses and clovers, an experiment was started in 1916. Alfalfa, red clover, and timothy were sown broadcast and also in rows about two feet apart. The results, as secured this year, show that in all instances much heavier seed crops were realized with the seed sown in rows two feet apart. Thus, alfalfa sown in rows two feet apart yielded 70 per cent heavier seed crop than when sown broadcast; red clover produced 75 per cent more seed when sown in rows and, in the case of timothy, a 90 per cent heavier seed crop was realized from row seeding. The results thus decidedly speak in favour of row seeding when seed production is aimed at. However, definite conclusions cannot be drawn until more data on the subject have been secured.

THE POULTRY DIVISION.

REPORT OF THE DOMINION POULTRY HUSBANDMAN, F. C. ELFORD.

GENERAL CONDITIONS.

Poultry conditions in Canada during the past year have been more or less unsettled. Owing to the high cost of feed in general, and the impossibility of securing some of the grains usually considered necessary for egg production, many curtailed their operations, while some seriously considered going out of poultry keeping altogether.

For a good part of the year, corn was not available, and wheat, the cheapest feed in Canada this year, and always the best, was being reserved largely for human food. Feed that could be procured was so high in price and of such a poor quality that it was a question with a number of producers whether anything could be made out of poultry even at the comparatively high prices received for the produce.

With a desire to increase production, a larger number than usual of urban flocks were started in the spring. These have assisted in production, though some have not proved as remunerative as was desired or expected. The reason for this lack of profit was mainly because of the age of the pullets. They were, as a rule, too young. Where the pullets were well grown and mature, the results were quite satisfactory, for though all feed was dear, new-laid eggs were never known to be so high.

The experience of this year but emphasizes what the previous two or three years have been teaching. Business principles in poultry keeping must be adopted, the old slip-shod methods must be abandoned. Late-hatched pullets do not produce winter eggs. Pullets for winter egg production must be hatched early so as to be matured before winter. Non-producers must be eliminated, and greater efficiency in the flock is the best way to increase production.

THE WORK OF THE DIVISION.

The work of the Poultry Division during the past year has been progressing very satisfactorily, though owing to the lack of accommodation, efforts along several lines of investigation have been considerably curtailed.

The flocks at the various Farms have not been increased, but rather decreased, as the culling of the flocks has been more severe than ever. Labour and feed have been hard to get, and high in price. Of the thirteen Farms keeping poultry, no less than eight of them lost their poultry managers, some because of enlistment, others because of higher wages being paid elsewhere.

Three new Farms were added during the year: Summerland, B.C.; Scott, Sask.; and Lennoxville, Que. One breed only will be kept at Summerland, White Wyandottes; at Scott, Barred Plymouth Rocks; at Lennoxville, the Rocks will also be installed when the stock is obtained this summer. Winter came on before the buildings were completed here, and operations will not commence until next season.

CENTRAL PLANT.

At the Central plant, good results were obtained in the breeding work, and the best crop of young stock that has ever been raised was the result of the season's operations. The pullets went into winter quarters more fully matured and in better shape generally than usual, with the result of an improved winter egg yield.

The pedigree work has advanced to such an extent that for the first time it has been possible to supply all branch Farms with cockerels from high-producing mothers. These cockerels were of an exceptionally good type and constitution, and should do much to improve the laying qualities of next year's pullets. It is expected that from these cockerels the branch Farms will have a considerable number of breeding males to dispose of to farmers next fall.

Owing to increased cost of operation, it was necessary to discontinue practically all of the turkey and waterfowl experiments on the Central plant, just a few breeding stock being retained. At Invermere, B.C., the turkey crop was as large as usual, and investigations there show that so far the ravages of blackhead are not present.

The new pipe brooder house on the Central plant has given satisfactory results. A similar house, but smaller, is being installed at Indian Head, Sask., and at Ste. Anne, Que. The stove brooders have continued to prove satisfactory, and, where large numbers of chicks are being brooded, they are replacing the small hovers.

EXPERIMENTAL WORK.

Among the lines of experimental work, concerning which more data have been obtained, and upon which greater emphasis is being placed are: The importance of the male in obtaining high egg yield; the value of early pullets for winter egg production; the unprofitableness of late pullets as a business proposition; the value of vigour in the breeding stock; artificial light in the laying pen during the short days; war-time rations; vegetable versus animal protein, etc.

Further experience was gained in feeding buckwheat screenings at the Central Farm and at the Maritime Farms. For the rearing of chicks it is a valuable and cheap feed, but as a scratch feed for winter use it is not suitable, though it does make a satisfactory mash feed when ground. Owing to the presence of weed seeds, it is better to be always ground before feeding.

POULTRY DISEASE INVESTIGATIONS.

During the year Dr. A. B. Wickware, Pathologist, in charge of poultry diseases, has, in addition to making the numerous diagnoses of sick and dead birds forwarded to the laboratory, conducted investigations with a number of poultry diseases. As a result of his work on intestinal parasites he published a bulletin "Intestinal Parasites of Poultry, their Prevention and Treatment," which gives considerable new data on this all-too-common trouble.

The same authority, in a small pamphlet entitled "Poultry Diseases Responsible for big National Loss," makes the statement that "at least 50 per cent of the chickens, young ducks and turkeys, and 10 per cent of the adult birds die each year from diseases, many of which are preventable."

If this is true, and there is every reason to believe that it is a conservative estimate, this would mean an actual loss of millions of dollars to the country. War conditions make it imperative that farmers and poultrymen endeavour to stop this national leak.

EXTENSION.

The survey work conducted in Quebec is still proving a valuable department of extension work. Another department of this work has been started in the sending out of copies of a "Farm Egg and Poultry Account" blank. Duplicate copies of these are returned to the office each month, and to each copy a reply is given pointing out how improvements can be made in the management. Valuable data are received by this Division on actual farm conditions, and suggestions are offered that will be helpful to the producers.

PROSPECTS OF THE INDUSTRY.

In spite of the high price of feed, there has been more enquiry for information and for stock and eggs this year than ever. Though the total number of poultry kept may not be increased, there is no doubt that the high cost of everything is tending to make producers put their plants on a business basis. The non-producers in the flock are being eliminated, more poultry keepers are keeping accounts, farm poultry plants are being renovated. The back-yard flocks are increasing, and though this year too many suburban families started out with immature pullets, those who had suitable birds have found that it is possible to produce eggs at a profit, and that table scraps that might go otherwise to waste can be turned into the very best of human food. In spite of the fact that no special propaganda for greater production of poultry has been conducted, the indications are that there will be an increased production brought about more by increased efficiency than by increased numbers.

THE TOBACCO DIVISION.

REPORT OF THE CHIEF OFFICER, F. CHARLAN.

Although the season of 1917 could not be considered a favourable one, the tobacco harvest was superior, both in quality and quantity, to that of the previous year.

In Quebec, the greatest difficulty met with was poor success in the seed-beds, owing to the cloudy and cool weather of the latter half of April and most of May. Thus while the preparation of the tobacco plantation was carried on under better conditions than in 1916, the seedlings for planting out were scarce in many localities.

Considerable damage was done by floods, storms, and hail. Heavy downfalls of rain were frequent, sometimes lasting for forty-eight hours, which prevented or destroyed the good effect of cultivation. Some plantations were almost completely killed out, simply for lack of air in the soil.

The summer was too cool to allow the plants to mature fully. This, with too much moisture, made the tobacco leaves thinner, so that fields which appeared to promise an almost normal yield gave a return much below the average in weight. Generally speaking, this fall in weight below average ran from 30 to 35 per cent in the province of Quebec. However, the finer texture of the leaf resulted in the cigar tobaccos being found suitable for use as wrappers in a larger proportion.

In Ontario, the tobacco crop of Essex and Kent suffered less from weather conditions, and was almost normal as to quality. This was true of the White Burleys and especially so of the flue-cured tobaccos. These yielded a much larger proportion of the true yellow leaf than usual.

The tobacco market was active. Owing to lowness of stocks on hand, due to a series of poor harvests, both in Canada and the United States, the demand was stronger than usual from manufacturers accustomed to handling our native tobaccos. The Ontario tobacco crop was all bought up before the close of 1917. Prices varied. White Burley brought from 15 to 22 cents a pound, and flue-cured tobaccos of the Virginia type from 30 to 38 cents. These prices were the highest ever obtained in Canada.

In Quebec, market conditions were the same. Wrapper tobaccos of good quality brought up to 35 cents a pound, according to time of sale; the average price was above 20 cents. The ordinary pipe tobaccos sold higher in sympathy.

In Ontario the curing process proceeded normally. In Quebec it was hindered by the excessive moisture content of the immature tobacco harvested, and was completely stopped by early severe winter weather which continued and interfered with the work of stemming.

Under the above conditions the Quebec-grown tobaccos were generally delivered to buyers with a larger proportion than usual of fat ribs, and an abnormal moisture-content. These drawbacks, however, were not limited to Quebec, but were also prevalent in Wisconsin and Ohio.

The use of charcoal stoves is more and more to be recommended for the curing of tobacco in Quebec. The experience of 1917 showed that these stoves should be lit about the middle of October, in order to make use of that part of the autumn when the cold is not too severe. The effect of the heaters is thus more marked, and less fuel is required.

HARROW, ONT., TOBACCO STATION.

Fall ploughing proved clearly superior to spring ploughing last year. In all cases the yield on fall-ploughed land was more uniform and of greater weight. Fall-

ploughing also permits of a better utilization of labour. Moreover, a large proportion of the grey worms are destroyed by the exposure of the larvæ to frost. It is the cheapest and probable the best means of combatting this pest.

The fight against the grey worm was continued at transplanting time by spreading a wash poisoned with Paris green, and by dipping the young plants, all but the roots, just before transplanting, into a solution or arsenate of lead in water (1½ ounces of the powder to one gallon of water). This method seemed more satisfactory than spraying with Paris green.

The results of tests with chemical fertilizers at Harrow in 1917 allow of recommending, for the yellow, flue-cured tobaccos, the following formula per acre:—

Sulphate of ammonia, 180 pounds.
Superphosphate (16 per cent), 400 pounds.
Sulphate of potassium, 200 pounds.

In practice the latter formula should be supplemented by an application, the preceding autumn, of a dressing of barnyard manure at the rate of 12 tons per acre. However, in order to bring out more clearly the effect of the artificial fertilizer, the plantation of White Burley did not receive any barnyard manure.

As to the yellow, flue-cured tobaccos, the direct application of barnyard manure is to be avoided as far as possible, in order to obtain a more clearly coloured leaf and to hasten maturity.

The use of seed produced in Canada from well-acclimatized varieties, cannot be too strongly recommended. This was again demonstrated in 1917, with two lots of White Burley of the same type, one grown from imported seed, the other from seed produced on the Harrow Station,

It may here be said that Canadian tobacco growers are becoming more and more alive to the value of home-grown seed, for the abundant seed-harvest at Harrow in 1917 was hardly sufficient to fill applications received.

FARNHAM, QUE., TOBACCO STATION.

The varieties grown at Farnham, 1917, were the Zimmer Spanish, the Big Ohio X Sumatra and the Yamaska. The crop at Farnham suffered considerably from numerous heavy downpours of rain, causing veritable floods. The parts saved of the Big Ohio X Sumatra and Yamaska yielded some comparative data as to the values of these two varieties. The Zimmer Spanish suffered much less and gave an almost normal yield, although the yield in weight, which had promised to be high, was scarcely 900 pounds per acre. Unfortunately, the texture of the leaf of this variety, which it had been planned to use as cigar binders, proved much more suitable for wrappers.

The seed-beds at Farnham were observed very closely during the spring of 1917. The temperature chart of the beds shows that those giving the best results had their highest temperature some inches below the surface. This is not surprising; it is explained by the greater reserve of heat which such a bed can hold. The conclusion to be drawn therefrom is that the Quebec tobacco grower should give up the cold bed entirely, even when covered with glass. They should, on the other hand, make up their beds fresh every year from the bottom, using, first, earth put in place in the spring so that it will become dried and warmed in the handling.

The practice sometimes followed of using seed-beds established the preceding year, simply scratching over the surface, and applying fertilizer if required, should be more and more abandoned. It is very easy, by using glazed frames, to warm the surface of such beds, but the heat so obtained does not penetrate very deeply, and such a bed cools rapidly after sunset.

ST. JACQUES L'ACHIGAN, QUE., TOBACCO STATION.

This Station yielded a good crop of Zimmer Spanish, although the leaves were rather thinner than desired. Maturity was better than at Farnham and the curing process was carried on more successfully. Only a small proportion of "fat ribs" was observed.

CENTRAL FARM, OTTAWA, ONT.

The experimental area was especially devoted to the study of certain selections of Maryland and of binder tobaccos of the Cuban type (Cuban, Mexican, Brazilian) and also to the cultivation of some special nicotine-producing tobaccos. As in former years, as much Comstock Spanish, Connecticut and General Grant as possible was grown to produce seed for the annual distribution.

The season was not very favourable for seed production and, generally speaking, the vitality of the seed was lower, barely reaching 75 per cent. Moreover, all plants affected with mosaic had to be rejected, so that the seed crop was considerably reduced.

The tobaccos grown for nicotine extraction yielded a small quantity of seed for a more extended trial. As a rule, however, these varieties ripen poorly, and hence give only a small amount of alkaloid.

The Marylands developed normally but did not ripen well enough to attain the desired colour, with the exception of one selection tried for the first time, which, in spite of the unfavourable season, gave a fairly fine leaf of clear colour, suitable for cigarette manufacture.

Among the Cuban varieties tried, a number of plants were selected which seem to promise a satisfactory yield. If the aroma can be preserved it may be possible to propagate these in Canada where, so far, the Cuban varieties grown from imported seed have not yielded heavily enough to induce growers to produce them, in spite of the manufacturer's demand. The study of different varieties at Ottawa was completed by a large number of biometric observations in order to determine as closely as possible their physical characters and variations in Canada. This work is important in the case of newly introduced varieties, and is also valuable with sorts already acclimated in noting how their characteristics are maintained.

Warehousing.—Special attention was paid to the fermentation of binder tobaccos. The method followed in Ohio, slightly modified, gave good results on a lot of Yamaska of the 1915 crop. Of all binder tobaccos submitted to manufacturers for their opinion, this lot of Yamaska was perhaps the best received. It had first received a light fermentation in bales during the entire summer of 1916, then, during the winter of 1916-17, it was dampened and fermented in a warm room. During this operation the product was aired three times before being finally baled. A lot of Aurora, also of the 1915 crop, was treated in the same way and gave a binder of not quite so delicate an aroma as the Yamaska.

The Belgian tobacco of the 1917 crop, and also a small lot of Zimmer Spanish, gave binders worth studying. The best results with these seemed to be obtained in submitting them first to fermentation in bulk and then to a refining process in a warm room for four to six weeks, after having put up the tobacco in boxes as soon as the fermentation in bulk was completed.

Distribution of seed.—The number of samples sent out in the winter of 1917-18 was much greater than usual, amounting to about 6,000 samples. Most of these were distributed in the province of Quebec and were made up mainly of the Connecticuts, General Grant, and Comstock Spanish. The demand for tobaccos suitable for wrappers increased considerably. In 1917 for the first time Canadian manufacturers tried for the above purpose the Connecticuts grown in the counties north of Montreal.

The high prices paid for the 1917 crop attracted the attention of growers in Quebec and it is probable that the 1918 crop will be the largest ever produced. The same is true of Ontario where, with a favourable season, a harvest greater than the record year of 1911 may be expected.

TOBACCO DISEASES.

As a whole, the tobacco plantations in Ontario suffered to about the same extent as in the two previous years. Root rot was less prevalent owing to the drier season, but cool weather, almost cold at the opening of the season, caused a considerable spread of mosaic. The proportion of plants attacked was much higher than in 1916.

DIVISION OF ECONOMIC FIBRE PRODUCTION.

REPORT OF THE FIBRE SPECIALIST, R. J. HUTCHINSON.

During the past year, investigations of economic fibre plants, and the study of the problems connected with flax fibre production in Canada were continued.

Experiments were carried on to determine what districts in Canada are suitable for flax fibre culture. Flax grown on these several areas has been collected at Ottawa and retted and scutched in the fully equipped flax mill situated at the Central Experimental Farm. The fibre obtained from flax grown in the western part of British Columbia, southwestern part of Ontario, the valley of the St. Lawrence, and the Maritime Provinces proved to be first-class in quality, and was readily sold to United States spinners. These report that the spinning qualities were equal to those of the best grades of Irish fibre, and suitable for use in the manufacture of high class linen fabric, a material limited as to supply, but absolutely essential in the manufacture of aeroplane wings and needed for machine-gun webbing, ambulance and truck covers, thread for sewing uniforms, and a number of other uses. An exhibit of flax fibre and products prepared by the Experimental Farm won a gold medal at the Toronto Exhibition last year.

A convention of flax growers was held at London, Ont., for the purpose of improving flax seed marketing conditions. In order to maintain the reputation that has been established in Ireland and the United States, it was recommended that a standard seed bag be used, having the trade mark stenciled on it, and that all fibre-growing seed be subject to government inspection. Besides it was agreed upon to establish a high grade of fibre this season.

To encourage farmers, in those sections of Canada suitable for the production of flax fibre, to engage in this occupation, a special circular No. 20 has been issued, which points out the necessity for the production of this crop, and describes methods in the cultivation, handling and marketing of the fibre.

To turn to account in the fibre market the vast quantities of seed flax straw produced in the western provinces, the method of cultivation would need to be changed. Heavier sowing than the customary half-bushel per acre would improve the quality of the straw, and probably yield more seed as well. Closer cutting and more careful threshing of such flax would be required to make the fibre at all suitable for coarse yarns or twines. A discovery of a new process for the treatment of prairie flax has been made by the Flaxen Fibre Development Association, Regina, Sask. The fibre acquires the permanence of linen, and a large spinning range. Such a discovery under present conditions is a matter for national congratulation, when the husbanding of national resources has become vital. It has been the writer's privilege to examine about fifty samples of the finished product. Experiments will be continued along this line until conclusive results have been secured.

During the coming year it is hoped to establish modern mills in some of the flax growing centres and to continue investigations already begun.

DIVISION OF ILLUSTRATION STATIONS.

REPORT OF THE SUPERVISOR, JOHN FIXTER.

Owing to the drought in parts of Alberta and Saskatchewan, the Illustration work in 1917 has shown the value of proper cultivation and the value of good seed.

This being the third season of the Illustration work in the province of Quebec, the value of rotation of crops is quite noticeable and is arousing the interest of the farmers in the districts in which the Stations are located.

ILLUSTRATION STATIONS IN SASKATCHEWAN.

Assiniboia.—Operator, P. J. H. Warren. The season of 1917 opened late, but there was a good supply of moisture and the soil was in good condition. The rainfall during the period of growth was light and crop yields, especially of oats, below the average. Wheat was sown May 5, oats May 12, and corn May 19. All crops except hay were completely destroyed by a hailstorm on July 13.

	Yield per acre.	Cost.
Alfalfa (estimated)	½ ton.	$7 91 per ton.
Western Rye Grass (estimated)	1½ tons.	2 86 "

Cabri.—Operator, F. W. Abraham. The season of 1917 opened fairly late, but the soil was moist and in good condition for growth. Wheat sown May 2 ripened August 15. Oats sown May 18 ripened September 8. Corn sown June 4 was harvested September 14. The season was a fairly dry one.

	Yield per acre.	Cost.
Wheat continuously	20 bush. 12 lb.	51½ c. per bush.
Wheat in the 2-year rotation	31 bush. 12 lb.	49 c. "
Wheat in the 3-year rotation	31 bush. 30 lb.	45 c. "
Wheat after corn	24 bush.	36 c. "
Oats in the 3-year rotation	43 bush. 12 lb.	32 c. "
Alfalfa seed yielded	126½ lb.	$2 78⅔ "
Alfalfa forage (estimated)	1 ton.	4 19 per ton.
Western rye grass (estimated)	1 ton.	4 46 "
Corn (estimated)	2 tons.	3 40 "

Biggar.—Operator, Dr. S. E. Shaw. The season here was rather late in opening but there was sufficient moisture at the time of seeding. It was quite dry throughout the growing season and all crops were light. Wheat sown April 27 ripened August 16. Oats sown May 8 ripened August 16. Corn sown May 16 was frozen down May 28.

	Yield per acre.	Cost
Wheat continuously	9⅔ bush.	$1 69⅔ per bush.
Wheat in the 2-year rotation	9⅜ bush.	1 63⅛ "
Wheat in the 3-year rotation	12⅛ bush.	1 097/10 "
Wheat after corn	8⅜ bush.	1 80⅔ "
Oats in the 3-year rotation	15⅜ bush.	0 54·9 "

Alfalfa and Western rye grass seeded this year.
Corn frozen down twice in spring, a failure.

Herbert.—Operator, Milton Holmes. The season opened later than usual with a good supply of moisture in the soil. Wheat sown May 2 ripened August 13. Oats sown May 2 ripened August 8. Corn sown May 24 was cut September 21. Very little rain fell during the growing season and as a result all crops were light.

	Yield per acre.	Cost.
Wheat continuously	2 bush.	$2 46⅔ per bush.
Wheat in the 2-year rotation	12 bush.	0 99½ "
Wheat in the 3-year rotation	16 bush.	0 68⅜ "
Wheat after corn	14 bush.	0 68 "
Oats in the 3-year rotation	12 bush.	0 88⅔ "
Alfalfa (estimated)	⅔ ton.	6 03 per ton.
Western rye grass (estimated)	2 tons.	2 28 "
Corn (estimated)	1¼ tons.	6 94⅛ "

Kindersley.—Operator, F. E. Halpenny. The season of 1917 opened quite late, owing to a late snowfall. Part of the season was dry but on the whole there was sufficient moisture in the growing season to produce a fair crop. Wheat sown May 12

ripened August 24, oats sown May 9 were harvested September 4, and corn sown May 25 was cut on September 17.

	Yield per acre.	Cost.
Wheat continuously..	8 bush.	$1 16⅛ per bush.
Wheat in the 2-year rotation..	20 bush.	0 64⅜ "
Wheat in the 3-year rotation..	18⅜ bush.	0 61⅜ "
Wheat after corn..	19 bush.	0 59 3/10 "
Oats in the 3-year rotation..	43¼ bush.	0 26 9/10 "
Alfalfa (estimated)..	1½ tons.	3 20 per ton.
Western rye grass (estimated)..	2¼ tons.	1 52½ "
Corn (estimated)..	2 tons.	5 42 1/10 "

Lloydminster.—Operator, Hugh Hill. The spring of 1917 opened later than usual, with plenty of moisture in the soil. This was one of the driest seasons in the district for some years, and crops were below the average, especially the oat crop. Wheat sown May 5 ripened September 4. Oats sown May 12 ripened August 28. Corn was sown May 25 but was frozen down early in August.

	Yield per acre.	Cost.
Wheat continuously..	11 bush.	$0 76⅜ per bush.
Wheat in the 2-year rotation..	20 bush.	0 65⅜ "
Wheat in the 3-year rotation..	16 bush.	0 69 7/10 "
Wheat after corn..	20 bush.	0 44⅜ "
Alfalfa (estimated)	½ ton.	8 04 per ton.
Western rye grass (estimated)..	1 ton.	5 24 "

Maple Creek.—Operator, G. L. Hammond. The spring of 1917 was rather late, but there was a good supply of moisture at seeding time and crops did not suffer much from drought until after they were in head. Wheat sown May 3 ripened August 9, oats sown May 26 ripened August 23 and corn sown May 28 was harvested September 11.

	Yield per acre.	Cost.
Wheat continuously..	16 bush.	$0 56 1/10 per bush.
Wheat in the 2-year rotation..	20 bush.	0 67⅜ "
Wheat in the 3-year rotation..	21 bush.	0 54 3/10 "
Wheat after corn..	11⅜ bush.	0 60⅜ "
Oats in the 3-year rotation..	12 bush.	0 83⅜ "
Alfalfa (seed)..	150 lb.	2 98⅜ "
Alfalfa (forage) (estimated)..	2 tons.	2 65½ per ton.
Western rye grass (estimated)	1 ton.	4 01½ "
Corn (estimated)..	2 tons.	5 79½ "

Moose Jaw.—Operator, J. J. Glassford. The spring of 1917 opened about 10 days later than the average. There was a good supply of moisture and the soil was in good tilth. The rain-fall during the growing season was light and crop yields below the average, particularly oats. Wheat sown May 2 ripened August 13, oats sown June 20, were cut for green feed August 24 and corn, sown May 17, was cut September 15.

	Yield per acre.	Cost.
Wheat in the 2-year rotation..	28 bush.	$0 51 7/10 per bush.
Wheat in the 3-year rotation..	28 bush.	0 45 "
Wheat after corn..	18 bush.	0 45 9/10 "
Oats—cut for green feed to catch wild oats.		
Alfalfa (estimated)..	1 ton.	5 02⅜ per ton.
Western rye grass (estimated)..	1 ton.	3 89 "
Corn (estimated)..	2 tons.	4 77 7/10 "

Pambrum.—Operator, C. W. Appelgren. The season of 1917 opened later than usual here with considerable moisture in the soil. The subsequent rainfall throughout the growing season was very light, and as result yields were low. Wheat sown

May 5 ripened August 13, oats sown May 14 were harvested August 25 and corn sown May 24 was harvested September 13.

	Yield per acre.	Cost.
Wheat continuously..	2⅜ bush.	$2 94 9/10 per bush.
Wheat in the 2-year rotation..	14¾ bush.	0 90 "
Wheat in the 3-year rotation..	14 5/12 bush.	0 76½ "
Wheat after corn..	12 bush.	0 64⅜ "
Oats in the 3-year rotation—cut for green feed, light crop.		
Alfalfa—reseeded.		
Western rye grass (estimated)..	1,100 lb.	7 31 per ton.
Corn (estimated)..	1¼ tons.	8 30⅔ "

Prelate.—Operator, W. Huxtable. The season of 1917 opened about a week later than the average. The soil was moist at time of seeding but the season was dry and crop yields below the average, oats being very light. Wheat sown April 27 ripened August 18. Oats sown May 5 ripened September 2. Corn sown May 16 made such poor growth it had to be ploughed down.

	Yield per acre.	Cost.
Wheat continuously..	4⅜ bush.	$1 55 9/10 per bush.
Wheat in the 2-year rotation..	17 bush.	0 76 7/10 "
Wheat in the 3-year rotation..	18 bush.	0 60 3/10 "
Wheat after corn..	11 bush.	0 81 7/10 "
Oats in the 3-year rotation..	6 bush.	1 47⅜ "
Alfalfa (estimated)..	800 lb.	9 13 7/10 per ton.
Western rye grass (estimated)..	1,500 lb.	5 40⅜ "

Radville.—Operator, Lewis Kroon. The season of 1917 opened about two weeks later than the average. There was plenty of moisture in the spring and the soil was in good tilth, so crops had a good start. Very little rain fell after seeding until harvest, hence the crops were light. Wheat sown May 7 ripened August 14. Oats sown May 22 were cut August 31. Corn sown June 1 was cut August 30.

	Yield per acre.	Cost.
Wheat continuously..	8 bush.	$ 1 14 1/10 per bush
Wheat in the 2-year rotation..	15 bush.	1 02 7/10 "
Wheat in the 3-year rotation..	15 bush.	81 08 "
Wheat after corn..	9 bush.	1 53 1/10 "
Oats—cut for green feed, light crop.		
Alfalfa and Western rye grass—seeded this year.		
Corn (estimated)..	⅜ ton.	22 72 per ton.

Shaunavon.—Operator, Neil McLean. The spring of 1917 opened quite late, but there was plenty of moisture and conditions were favourable for growth. During the growing season the rainfall was very light, and as a result crop yields were low, especially on stubble land. Wheat sown May 7 ripened August 16. Oats sown May 8 were cut early for green feed. Corn was sown May 22 and was badly frozen down early in August.

	Yield per acre.	Cost.
Wheat continuously—a failure.		
Wheat in the 2-year rotation..	13 bush.	$1 01⅜ per bush.
Wheat in the 3-year rotation..	14½ bush.	0 80 3/10 "
Wheat after corn..	10 bush.	0 91 3/10 "
Oats in the 3-year rotation—cut for green feed, light crop.		
Alfalfa (estimated)..	1½ tons.	3 38 1/10 per ton.
Western rye grass (estimated)..	1½ tons.	2 91 3/10 "
Corn a failure, frozen early in the autumn.		

Weyburn.—Operator, E. Meredith. Spring opened fairly late with plenty of moisture and the soil in good tilth. Wheat sown May 3 ripened August 17. Oats

sown May 19 were harvested September 1, and corn sown May 19 was harvested second week of September. The season was quite dry and crops suffered considerably.

	Yield per acre.	Cost
Wheat continuously..	13 bush. 15 lb.	$0 58 1/10 per bush.
Wheat in the 2-year rotation..	17 bush.	0 77 2/3 "
Wheat in the 3-year rotation..	19 bush.	0 64 1/10 "
Oats in the 3-year rotation.	15 bush.	0 71 1/10 "
Alfalfa..	1 ton.	8 24 per ton.
Western rye grass..	2 tons.	2 90 "
Corn..	2 tons.	3 92 3/19

ILLUSTRATION STATIONS IN ALBERTA.

Bow Island—Operator, Martin Mortensen.—The season opened later than usual with a good moisture supply. The rainfall during the growing season was light, and crops suffered from drought. Wheat sown May 3 ripened August 14, oats sown May 3 ripened August 13, and corn sown May 24 was cut August 28.

	Yield per acre.	Cost.
Wheat continuously..	13 bush.	$0 74 per bush.
Wheat in the 2-year rotation..	19 1/8 bush.	0 80 "
Wheat in the 3-year rotation..	18 5/6 bush.	0 72 "
Wheat after corn..	16 2/3 bush.	0 59 "
Oats in the 3-year rotation..	19 bush.	0 66·3 "
Alfalfa, seeded this year, no crop.		
Western rye grass (estimated)..	1 1/3 tons.	5 63 per ton.
Corn (estimated)..	1,200 lb.	15 87 "

Grassy Lake.—Operator, D. C. Perry. The spring opened about the usual time with plenty of moisture. The second half of the growing season was dry and crops were not so heavy as expected. Wheat sown April 13 ripened August 14, oats sown May 3 ripened August 20, and corn sown May 18 was cut September 29.

	Yield per acre.	Cost.
Wheat continuously..	15 bush.	$0 67 per bush.
Wheat in the 2-year rotation..	24 bush.	0 65·5 "
Wheat in the 3-year rotation..	24 bush.	0 57·5 "
Oats in the 3-year rotation..	30 bush.	0 44·4 "
Alfalfa, seeded this year.		
Western rye grass (estimated)..	2 tons.	4 47 per ton.

Whitla.—Operator, R. H. Babe. The spring of 1917 opened rather late with a fair supply of moisture, but the season on the whole was quite dry. Wheat sown May 2 ripened August 13, oats sown May 18 ripened August 23, and corn sown May 19 was cut September 1.

	Yield per acre.	Cost.
Wheat continuously..	5 1/2 bush.	$1 77 per bush.
Wheat in the 2-year rotation..	19 1/8 bush.	0 89 "
Wheat in the 3-year rotation..	19 bush.	0 74·7 "
Wheat after corn..	14 4/9 bush.	0 66·8 "
Oats in the 3-year rotation..	17 bush.	0 72·4 "
Alfalfa (estimated)..	1 ton.	7 08 "
Western rye grass (estimated)..	2 tons.	3 61 per ton.
Corn (estimated)..	1 ton.	11 58 "

Manyberries.—Operator, M. Mickelson. The season opened about a week later than usual. Early in the growing season there was a good supply of moisture but later it became very dry and crop yields were disappointing. Wheat was sown April 27, and oats May 11.

	Yield per acre.	Cost.
Wheat continuously..	5 bush.	$0 82 per bush.
Wheat in the 2-year rotation..	10 1/2 bush.	1 18 "
Wheat in the 3-year rotation..	12 bush.	0 90 "
Wheat after corn..	8 1/2 bush.	0 98
Oats in the 3-year rotation—no crop on account of drought.		
Alfalfa (estimated)..	1,667 lb.	9 44 per ton.
Western rye grass (estimated)..	2,500 lb.	4 61 "
Corn, no crop.		

High River.—Operator, B. F. Kiser. Spring opened at the usual time with plenty of moisture. Later in the season the weather was quite dry and hot, and crops suffered from drought. Wheat was sown April 20, oats June 3, and corn June 12. All crops except alfalfa and rye grass were destroyed by hail.

	Yield per acre.	Cost.
Alfalfa (estimated)	1 ton.	$5 28 per ton.
Western rye grass (estimated)	1¾ tons.	3 88 "

Magrath.—Operator, J. A. Meldrum. The spring opened the usual time with favourable conditions. There was sufficient rainfall until the last of June, when it became dry and crop yields were not so good as expected. Wheat sown April 14 ripened August 20, oats sown May 17 ripened August 20, and corn sown June 1 was cut September 3.

	Yield per acre.	Cost.
Wheat continuously	18⅔ bush.	$0 55·2 per bush.
Wheat in the 2-year rotation	29 bush.	0 55·4 "
Wheat in the 3-year rotation	27½ bush.	0 51·6 "
Wheat after corn	27⅔ bush.	0 38 "
Oats in the 3-year rotation	34 bush.	0 35·7 "
Alfalfa (estimated)	1 ton.	4 14 per ton.
Western rye grass (estimated)	2 tons.	2 72 "
Corn (estimated)	7 tons.	1 00 "

Pincher Creek.—Operator, Messrs. Sandgren and Carlson. Spring opened later than usual with plenty of moisture to start the crop. The weather was favourable until the middle of June, when it became dry. Wheat sown May 7 ripened August 27. Oats sown May 8 ripened August 27. Corn sown June 5 was cut August 27.

	Yield per acre.	Cost.
Wheat continuously	11 bush.	$0 83·7 per bush.
Wheat in the 2-year rotation	27⅔ bush.	0 57 "
Wheat in the 3-year rotation	27⅔ bush.	0 50·9 "
Wheat after corn	15⅙ bush.	1 03 "
Oats in the 3-year rotation	33⅔ bush.	0 45·8 "
Alfalfa (estimated)	1⅓ tons.	4 20 per ton.
Western rye grass (estimated)	2 tons.	4 26 "
Corn, light crop, no estimate.		

Macleod.—Operator, Norman Grier. The season opened the usual time. There was plenty of moisture up to the middle of June when it became dry and crops suffered. Wheat sown April 21 ripened August 20, and oats sown May 10 were cut August 20. There was no corn grown at this station this year.

	Yield per acre.	Cost.
Wheat continuously	22⅔ bush.	$0 43·6 per bush.
Wheat in the 2-year rotation	26 bush.	0 55 "
Wheat in the 3-year rotation	28 bush.	0 46·9 "
Wheat after corn	29⅓ bush.	0 37·8 "
Oats in the 3-year rotation	62 bush.	0 22·6 "
Alfalfa (estimated)	1,000 lb.	7 05 per ton.
Western rye grass	900 lb. seed.	10 29 per acre.

Munson.—Operator, R. R. Fraser. The season of 1917 opened late with a good supply of moisture in the soil. The latter part of the season was dry but crops came through well. Wheat sown May 8 ripened August 24. Oats sown May 11 ripened August 28. Corn sown May 15 was cut August 29.

	Yield per acre.	Cost.
Wheat continuously	15 bush.	$0 69·9 per bush.
Wheat in the 2-year rotation	38 bush.	0 48·6 "
Wheat in the 3-year rotation	38 bush.	0 43·3 "
Wheat after corn	38 bush.	0 45 "
Oats in the 3-year rotation	74 bush.	0 26 "
Alfalfa seeded this year.		
Western rye grass seeded this year.		
Corn (estimated)	1 ton.	11 59 per ton.

Milk River.—Operator, B. L. Cornwall. The season was late in opening but the soil was quite moist, so crops had a good start. The latter part of the growing season was dry. Wheat sown May 8 ripened August 23. Oats sown May 22 ripened September 1. Corn sown May 23 was cut September 1.

	Yield per acre.	Cost.
Wheat continuously..	13 bush.	$0 67·9 per bush.
Wheat in the 2-year rotation..	22⅔ bush.	0 64 "
Wheat in the 3-year rotation..	23 bush.	0 54·6 "
Wheat after corn..	26 bush.	0 35·8 "
Oats in the 3-year rotation..	33⅔ bush.	0 41·6 "
Alfalfa (estimated)..	2 tons.	2 48 per ton.
Western rye grass cut for seed.		
Corn (estimated)..	1,500 lb.	9 14 "

Empress.—Operator, Frank Barrie. The season opened about the usual time with a good supply of moisture. On the whole it was a dry season and crop yields were fair except oats which were quite light. Wheat sown April 17 ripened August 9, oats sown May 14 ripened August 21 and corn sown May 24 was cut September 11.

	Yield per acre.	Cost.
Wheat continuously..	12 bush.	$0 74 per bush.
Wheat in the 2-year rotation..	25 bush.	0 63·2 "
Wheat in the 3-year rotation..	24 bush.	0 57·7 "
Wheat after corn..	23 bush.	0 49·5 "
Oats in the 3-year rotation..	16⅔ bush.	0 32 "
Alfalfa (estimated)..	975 lb.	1 40 per 100 lb.
Western rye grass (estimated)..	1,200 lb.	1 01 "
Corn (estimated)..	3 tons.	2 08 per ton.

Foremost.—Operator, T. H. Frankish. The season of 1917 opened about the usual time with a good supply of moisture. The latter part of the growing season was dry and crops ripened too quickly. Wheat sown April 21 ripened August 14. Oats sown May 23 ripened August 16. Corn sown May 17 was cut August 24.

	Yield per acre.	Cost.
Wheat continuously..	9⅔ bush.	$0 83·7 per bush.
Wheat in the 2-year rotation..	23⅔ bush.	0 70 "
Wheat in the 3-year rotation..	27⅔ bush.	0 50·8 "
Wheat after corn..	14⅔ bush.	0 74·5 "
Oats in the 3-year rotation..	22 bush.	0 51 "
Alfalfa (estimated)..	1 ton.	3 73 per ton.
Western rye grass (estimated)..	1,500 lb.	3 54 "
Corn (estimated)..	1,500 lb.	10 95 "

Carmangay.—Operator, J. A. Neilson. The spring of 1917 opened in fair time. There was a good supply of moisture until the crops were in head. Then it became dry. Wheat sown April 23, ripened August 24. Oats sown May 15, ripened September 9. Corn sown May 20 was cut September 7.

	Yield per acre.	Cost.
Wheat continuously..	5 bush. 42 lb.	$1 34 per bush.
Wheat in the 2-year rotation..	23 bush. 21 lb.	0 60·8 "
Wheat in the 3-year rotation..	21 bush. 52 lb.	0 56 "
Wheat after corn..	20 bush. 32 lb.	0 54·3 "
Alfalfa (estimated)..	1¾ tons.	2 77 per ton.
Western rye grass (estimated)	1,810 lb.	4 04 "

Jenner.—Operator, Jerry Fisher. The season of 1917 opened a little later than usual with plenty of moisture in the soil. The first part of the growing season was favourable but later it became quite dry and crop yields were disappointing. Wheat

sown April 26, ripened August 18. Oats sown May 5 were a failure on account of drought. Corn sown May 19 was cut September 1.

	Yield per acre.	Cost.
Wheat continuously..	12⅝ bush.	$0 69·8 per bush.
Wheat in the 2-year rotation..	14⅜ bush.	1 02 "
Wheat in the 3-year rotation..	20 bush.	0 63·3 "
Wheat after corn..	15⅛ bush.	0 61 "
Oats in the 3-year rotation..	No yield.	
Alfalfa (estimated)..	1 ton.	4 15 per ton.
Western rye grass (estimated).. ..	1½ tons.	5 15 "
Corn (estimated)..	4 tons.	1 82 "

ILLUSTRATION STATIONS IN QUEBEC.

Aubrey, Chateauguay County.—Operator, Samuel Reddick. The soil on this farm is a heavy clay loam, which would be improved by tile drainage, particularly when corn is grown on it. Four-year rotation:—

Field A: Corn, Leaming and Golden Glow, gave an estimated yield of 10 tons per acre, costing $26.56 per acre.

Field B: Banner oats yielded 52 bushels 3 pounds per acre, costing $16.04.

Field C and D: Clover hay. First crop harvested in June gave an estimated yield of 2 tons 400 pounds per acre, costing $14.03. A second crop from the same field was harvested in October, which gave an estimated yield of 1¼ tons per acre. Out of this second crop was threshed 231 pounds of seed per acre. Much improvement was seen in the hay crop on this Station.

Drummondville, Drummond County.—Operator, Amédée Marier. The soil on this farm is a good sandy loam but requires tile drainage. Four-year rotation:—

Field A: Hay gave, in two cuts the same season, an estimated yield of 1 ton 782 pounds per acre, costing $7.55 per acre.

Field B: Corn, Longfellow, estimated yield 8 tons per acre, costing $21.54 per acre.

Field C: Clover hay, 2 tons per acre, costing $11.35 per acre.

Field D: Banner oats yielded 33 bushels per acre, costing $11.41 per acre.

Lac à la Tortue, Champlain County.—Operator, S. T. Lupien. The soil on this station is exceptionally light sand depleted of plant food, and appears to be underlaid with water from an adjoining lake. The four-year rotation started on this station is making satisfactory progress:—

Field A: Banner oats yielded 15 bushels per acre, costing $14.63 per acre.

Field B: Hay, estimated three-quarters of a ton per acre, costing $13.75 per acre.

Field C: Corn, estimated yield 8 tons per acre, dry fodder, costing $15.92 per acre. Potatoes, 51 bushels, costing $38.68. Swedes, 7 tons per acre, costing $32.90.

Field D: Barley yielded 18 bushels per acre, costing $14.20 per acre. Straw not estimated.

Nomining, Labelle County.—Operator, E. Lamoureux. The soil on this station is a light sand depleted of humus, on account of its rolling character and the surrounding district. The growing of forest trees would be more suitable than farm crops. Four-year rotation:—

Fields A and B: Hay, estimated yield three-quarters of a ton per acre, costing $9.98 per acre

Field C: Potatoes yielded 228 bushels per acre, costing $57.47 per acre.

Field D: Banner oats yielded 45 bushels per acre, costing $16.25.

New Carlisle, Bonaventure County.—Operator, E. M. Legallais. The soil on this station is heavy, sandy loam, and requires drainage. Couch grass and other weeds are

abundant, and several hoed crops will be required to eradicate them. Four-year rotation:—

Field A: Potatoes yielded 110 bushels per acre, costing $38.73 per acre. Swedes and mangels yielded 16 tons per acre, costing $2.42 per ton.

Fields B and C: Hay, estimated yield 1 ton 300 pounds per acre, costing $10.30 per acre.

Field D: Oats, Ligowo; yield 31 bushels per acre, costing $19.65. Straw not estimated.

St. Isidore, Dorchester County.—Operator, Adelard Bilodeau. Owing to excessive moisture and lack of tile drainage, crops on the Illustration Station, as well as in the surrounding district, were below the average.

Field A: Clover hay, yield estimated 2 tons per acre, costing $11.62 per acre.

Field B: Banner oats yielded 30 bushels per acre, costing $16.39 per acre.

Field C: Corn, estimated yield 7 tons per acre, costing $28.42 per acre.

Field D: Hay, estimated yield 1½ tons per acre, costing $11.83 per acre.

Rimouski, Rimouski County.—Operator, Nazaire Begin. Three-year rotation, as follows:—

Field A: Potatoes yielded 171 bushels per acre, costing $74.63 per acre. Corn, estimated yield 6¼ tons dry fodder, costing $42.24 per acre.

Field B: Banner oats yielded 42 bushels per acre, costing $15.98 per acre.

Field C: Hay, estimated yield in two cuts, 2 tons 812 pounds per acre, costing $15.98.

Four-year rotation, as follows:—

Field A: Banner oats yielded 47 bushels per acre, costing $16.31.

Field B: Potatoes yielded 217 bushels per acre, costing $74.44. Turnips and mangels yielded 12 tons per acre, costing $76.79 per acre.

Field C: Hay, estimated yield 1 ton 314 pounds per acre, cost $13.96.

Field D: Banner oats yield 48¾ bushels per acre, cost $15.07 per acre.

St. Gèdéon, Chicoutimi County.—Operator, Wilfrid Simard. Three-year rotation:—

Field A: Marquis wheat gave a yield of 24 bushels 3 pounds per acre, costing $18.88 per acre.

Field B: Potatoes yielded 240 bushels per acre, costing $69.44 per acre. Corn yielded 7 tons per acre, costing $26.56 per acre.

Field C: Clover hay yielded 2 tons per acre, costing $15.33 per acre.

Four-year rotation, as follows:—

Field A: Banner oats yielded 58 bushels per acre, costing $16.48 per acre, straw not calculated.

Field B: Clover hay yielded 2½ tons per acre, costing $12.53 per acre.

Field C: Clover hay yielded 1½ tons per acre, costing $11.46 per acre.

Field D: Roots yielded 12 tons per acre, costing $46.08 per acre.

Stanbridge East, Missisquoi County.—Operator, Chas. S. Moore. Owing to the heavy, wet nature of the soil, seeding was about ten days later than usual.

Fields A and B: First-year hay cut. Most of the crop was clover, which gave an estimated yield of 1 ton 1,200 pounds per acre, costing $15.19. A second crop of clover was harvested the same season, yielding 1,400 pounds per acre. This crop was threshed, giving a yield of 40 pounds of clover seed, per acre, at a cost of 12½ cents per pound.

Field C: Banner oats yielded 49 bushels per acre, costing 41 cents per bushel. No allowance is made for straw.

Field D: Corn, Quebec Yellow. Owing to the unfavourable season a light crop of seed was harvested, yielding 88 bushels cob and about 4 tons of fodder per acre, costing $26.50 per acre.

Ste. Julie, Verchères.—Operator, Adolphe Hébert. The soil on this station is a heavy sandy loam which requires tile drainage. Four-year rotation:—

Fields A and B: Clover hay. First crop gave an estimated yield of 1½ tons per acre, costing $12.67 per acre. A second crop harvested the same season gave an estimated yield of 1 ton per acre, out of which crop 90 pounds per acre of clover seed was threshed.

Field C: Corn, Leaming, Golden Glow, and Longfellow, gave an estimated yield of 10 tons per acre, costing $19.38 per acre.

Field D: Banner oats yielded 31 bushels per acre, costing $12.95 per acre.

The clover fields above mentioned won first prize in a county competition.

DIVISION OF EXTENSION AND PUBLICITY.

REPORT OF THE OFFICER-IN-CHARGE, W. A. LANG.

The work of the Division of Extension and Publicity was continued during the year, the main lines being those enumerated in previous reports, and may briefly be recapitulated as follows:—

1. The display at fairs and exhibitions of an Experimental Farm Exhibit.
2. The issuing and distribution of exhibition circulars.
3. The enlarging of the mailing lists.

The number of fairs and exhibitions attended was slightly larger than the previous year, amounting to 146 in all; 29 of these were covered by exhibits sent out from the Central Experimental Farm, and the remaining 117 were attended to by the branch Farms and Stations. In a general way the plan was to utilize each branch Farm or Station as a centre from which the Experimental Farms Exhibit was sent out to a circuit of fairs within a reasonable radius of the Farm or Station. The staging for these exhibits, and the main features of the work displayed, were prepared at Ottawa. This ensures the requisite amount of uniformity, and tends to emphasize the solidarity and cohesion of the Experimental Farms system. To these main features are added such local items as the branch Farm Superintendent considers interesting and worthy of display. Fresh flowers, fruits, etc., are, of course, supplied by the Superintendent, and add a great deal to the attractiveness of the whole. At these fairs, a distribution is made of exhibition circulars, of which we have at present a very comprehensive collection covering most of the main features of agricultural effort in Canada, and, in addition, names and addresses of those wishing to be placed on the departmental mailing list are taken. During the last season almost 16,000 names were added in this way. It is unnecessary to report in detail as to the reception which the Experimental Farms exhibit met at the fairs throughout the country, but the general comment may be made that a very encouraging amount of interest was shown. At all points where an exhibit was made, requests were received for a return visit during the next season, and a number of applications have been received from the managers of fairs at which an exhibit has not yet been made that we display there another year. These requests are as far as possible being met, the only difficulty in the way being the number of cases where dates clash, owing to such a large number of country fairs being held throughout Canada within such a short space of time.

Owing to the expansion of the exhibition work, it was found impossible to give the necessary amount of personal attention to the preparation of "Seasonable Hints" and the editing and issuing of press articles, and, consequently, other arrangements were made for the handling of these in future. The time so gained has been very profitably applied to the main work of the Division.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

THE SEASON.

The "freeze up" for the winter of 1916-17 came on December 11. The first part of the winter was mild, up to January 20, when a period of stormy, cold, changeable weather set in, which lasted until the end of the first week in February. The remainder of February and the whole of March was fine. April was dull and cold, except for a few days after the thunderstorm of the 22nd, when land worked nicely, and wheat was sown. The weather continued backward through the greater part of May, so that seeding in general was late. Through June and July the weather conditions were very favourable for maximum plant growth; the first hay was cut on July 14, and the crop was an average one. There was an abundant rainfall in August, which greatly increased crop yields. September was very favourable for harvesting grain, and all crops yielded well except those injured by insects and fungous pests. There was a very heavy rainfall in October, which delayed fall ploughing. November was more favourable, and autumn work was well advanced throughout the province before the "freeze up." Winter set in early, with a heavy snowstorm on December 2, and sleighs went continuously from that time till the end of March. The winter as a whole was stormy, and transportation was badly blocked at different periods. The snowfall for the winter was excessive, being over 148 inches, and as there was very little frost in the ground, the moisture from this source has practically all soaked away.

METEOROLOGICAL RECORDS.

Months.	Temperature, Fahrenheit.					Precipitation.					Bright Sunshine.
	Maximum.		Minimum.		Mean.	Rainfall.		Snowfall.		Total.	
1917.	Date.	Deg.	Date.	Deg.	Deg.	Days.	In.	Days.	In.	Inches.	Hours.
April	23 & 24	57	1	24	37·199	9	3·36	2	1·02	3·46	96·8
May	25	60	2	28	41·257	20	3·52	.....	.....	3·52	121·3
June	19	81	1	37	60·266	13	2·54	.....	.....	2·54	179·9
July	26	85	2 & 7	50	65·564	15	1·92	.....	.....	1·92	186·2
August	20	88	22	49	68·209	13	4·93	.....	.....	4·93	227·9
September	27	76	26	39	56·033	8	1·71	.....	.....	1·71	246·5
October	4 & 31	69	8	32	48·758	18	7·02	.....	.....	7·02	136·9
November	23	56	29	13	33·249	10	3·06	7	10·00	4·06	73·5
December	9	45	13	− 7	19·79	3	0·49	13	51·55	5·64	46·2
1918.											
January	5	42	3	−11	15·379	5	2·41	10	15·00	3·91	111·9
February	26 & 27	45	2 & 6	−14	13·607	5	0·73	10	30·00	3·73	104·3
March	31	45	8	−12	19·951	1	0·68	12	41·00	4·78	139·9
Total annual	.....	.....	.....	.....	.....	120	32·37	54	148·57	47·22	1671·3

LIVE STOCK.

Horses.—Darling of Taunton gave a very fine mare foal on May 13 and Nell, a grade mare, a nice filly on June 6. One mare and one foal were sold, and one mare purchased, so that on May 31, there were five draught mares, a pure-bred Clydesdale foal, two draught colts, an express horse, and a driving mare; these were all in excellent condition for the spring work.

Dairy Cattle.—The two Ayrshire cows gave an average of 7,500 pounds of milk, and dropped a calf each, previous to the time that they were disposed of in December. One calf and a yearling heifer were sold, leaving at present a two-year-old heifer and a bull calf.

Steers.—Twenty steers were selected out of a large drove of cattle and purchased from a dealer on October 15, at 8¼ cents per pound live weight. They were dehorned and put on good pasture which included a strip of rape, until November 1, when the experiments were started. The cost, plus pasturage, when weighed into their pens, was $8.40 per hundredweight. The total weight of the five pens was 8 tons 920 pounds. Two steers in pen V, when tested with tuberculin, were classed as suspicious, and slaughtered December 22. There was a trace of the disease in a gland in one, and in connection with an internal tumor in the other. These two cattle had cost, November 1, $133.56; their feed came to $19.88. They were sold, under inspection, for $147.42, the net loss being $6.02. The weight of the twenty steers when sold after a sixteen-hour fast, was 10 tons 1,165 pounds; the gain of the eighteen steers being 2 tons 120 pounds in 133 days. The two steers had gained 125 pounds in fifty days. The average price realized at the auction was $11.02¾ per hundredweight. The net profit on the twenty steers, after deducting the cost of feed at current market prices and the loss in connection with the two steers, was $279.97. The following comparisons were made from the experimental work:—

Beef versus dairy steers—Gains and profits.—The weights of eight dairy type steers were compared with those of eight beef type steers. The dairy steers made an average gain on the same feed of 9⅜ pounds each in the 133 days' test. The selling price of the dairy steers was $10.62 per hundredweight, or 58 cents less per hundredweight than the selling price of the beef steers; so that the beef steers gave an average profit over the dairy steers of $6.49 each.

Heavy Feeding of Roots Throughout Period Versus Gradually Decreasing the Roots Fed from Start to Finish.—Eight steers were fed 45 pounds of roots per steer per day throughout the period, and the returns compared with those from eight other steers that were fed 45 pounds of roots per steer per day in November, 35 pounds roots per day from December 1 to January 20, then 25 pounds per day until March 1, and only 22½ pounds per steer per day for the last two weeks. The grain fed to all these steers was increased uniformly from 4 pounds per day up to 35 pounds per day. The steers that were fed continuously with the heavy ration of roots, namely, 45 pounds per steer per day, made an average gain of 11 pounds over the others. This increase cost $2.99 per steer, or 27 cents per pound of extra gain.

Lambs.—Thirty lambs were purchased November 1 at 14 cents per pound live weight, after a long fast. They were allowed to run on good pasture until November 10, when they were weighed into pens for experiments with different roughages, for 124 days. They were sold at auction, March 14, 1918, in lots of 10, at 16¼ cents, 17 cents, and 17½ cents per pound live weight. The average net profit per lamb was $1.60, neglecting labour and manure.

POULTRY.

There is a well-equipped poultry plant for 220 hens at the Station. These are about equally divided between Single Comb White Leghorns and Barred Plymouth Rocks. A mammoth incubator has been ordered, and progressive work is planned to meet the growing needs of the province.

BEES.

One colony was kept; it was prevented from swarming, and produced 40 pounds of honey, which was sold at 16 cents per pound. The colony wintered fairly well.

FIELD CROPS.

Average yield per acre on the Experimental Farm rotations:—

Wheat: Four fields gave an average yield of 18 bushels and 42 pounds. The earliest sown escaped the "Wheat Scab" and "Glume Spot" better than the later seedings.

Barley: Two fields of barley averaged 35 bushels and 37 pounds per acre.

Hay: Twelve fields of hay averaged 2 tons and 953 pounds per acre.

Mangels: Three fields of mangels averaged 869 bushels and 28 pounds per acre.

Oats: Four fields of oats averaged 42 bushels and 32 pounds per acre.

Potatoes: Two fields of potatoes averaged 304 bushels and 6 pounds per acre.

Turnips: Twenty-four plots of turnips gave an average yield of 26 tons, 890 pounds per acre.

Twenty acres of mangels for stecklings were sown in July. These did much better than was expected. They were pitted in the exhibition buildings, and wintered with scarcely any loss. Two acres of turnips for stecklings were sown in the plum and cherry orchards. These gave a large yield, but owing to the presence of club root, there was some loss in the pits during the winter.

Co-operative Test of Oats.—A co-operative test with Banner and Victory oats was carried on with twelve farmers in the neighbourhood of the Station. The average yields of the plots were as follows:—

Banner	47 bushels	33 pounds.
Victory	47 "	28½ "

Field Cultural Experiments.—The cultural work was continued, and valuable data on this important work gathered.

CEREALS.

The leading strains of cereals were tested in duplicate plots of one-sixtieth acre each on an area that was specially prepared for this work. Among the eleven varieties of spring wheat, Huron is mentioned as the variety that seemed to resist fungus diseases to a greater extent than the other varieties. Banner oats is recommended for this province, and was second among twelve varieties. Charlottetown No. 80 barley has been a leader at this Station for years, and was second among the fifteen varieties of barley. Solo led among the four varieties of peas.

FORAGE CROPS.

Four varieties of corn ripened out of the seventeen varieties tested in 1917, Quebec Yellow being the most satisfactory of these for grain. Thirty-six varieties of turnips were tested, and among the older varieties Good Luck was near the head of the list. Giant Yellow Intermediate led the twenty varieties of mangels. The test of carrots was destroyed by the rust-fly. The Russian sugar beet gave the largest yield among the four varieties tested. The old grass and clover plots gave very good returns. Three additional acres were used to test further alfalfa and a large number of mixtures of grasses and clovers.

HORTICULTURE.

Orchards.—The orchards made fair growth during the season. The crop was below the average. The orchards were sprayed regularly, and the fruit was clean.

Small Fruits.—Gooseberries, raspberries, and strawberries gave good crops of fruit. The currants were below the average, and very little fruit formed of the black varieties.

Lawns, Trees, Shrubs and Flowers.—The ornamental trees and shrubs on the Station greatly improve the appearance of the lawns and grounds. They have grown well, and were slightly rearranged to improve the effect. A quarter of an acre of the east lawn was sown down to wheat. The flowers, including the water lilies, were one of the greatest attractions to visitors.

Vegetables.—Cultural experiments and variety tests were continued with all the leading vegetables. Special mention is made of the beans, tomatoes, corn, and onions, which gave unusual returns, the season being very favourable for them.

ADDITIONAL LAND.

Thirty acres of land lying between the St. Peter's road and the Kensington road were leased. and 20 acres of mangel stecklings grown there in 1917. Five acres of land, at the corner of the Mount Edward and DeBlois roads, were leased for ten years with an option of purchase any time during the period. Six and a half acres of land at the corner of Kensington road and Spring lane were leased for three years.

BUILDINGS.

The Station buildings received a few minor repairs, no new buildings were erected, and all are in good condition.

FARMERS, AND SCHOOL CHILDREN'S PICNICS—VISITORS.

Demonstrations in spraying were arranged during the farmers' picnics and on August 28 every passenger car on the P.E.I. railroad was loaded to capacity with visitors for the Station. Demonstrations were also arranged in pottings and caring for plants, and on October 16 more than 1,500 school children visited the Station. The total number of visitors recorded during the year was 8,193.

EXHIBITIONS.

The setting of the Station display was entirely new in 1917. The colour scheme was white and gold. The very best location in the exhibition building at Charlottetown was secured. At Summerside, in co-operation with the Live Stock Branch, a large hall in the centre of the town was occupied, and notwithstanding the fact that the county exhibitions were held simultaneously, a good display was made at all. The Superintendent judged at the several exhibitions, at the school fairs at Mount Stewart, Bedeque, and Crapaud, and at the Provincial Seed Fair.

CONVENTIONS, ASSOCIATIONS AND CONFERENCES.

The Superintendent attended the various conventions and associations held during the year in the province, and gave addresses at most of them. He was appointed on the Provincial Fruit and Vegetables Committee of the Food Board, and was Director of the Soldiers of the Soil movement for Charlottetown. He attended the New Brunswick Potato Growers' Association at Woodstock, judging at their potato show.

SHORT COURSES AND AGRICULTURAL MEETINGS.

The Superintendent gave a course of lectures on field husbandry and on cereals at a series of short courses held during the winter at different centres throughout the province. He also addressed farmers' institutes, when requested, and gave lectures on horticultural subjects to the several short-course classes in domestic science. Instruction was given at the Station to the judges of the Standing Fields Competition.

SALE OF SEED GRAIN, AND DISTRIBUTION OF SEED POTATOES.

The best strains of registered seed were grown on multiplying fields on the rotations. These were sold to farmers, who made application, at current prices. Many have taken advantage of this opportunity to secure foundation stock for their farms. Charlottetown No. 80 barley continued to be the most popular seed grain, and orders were received for many times the available supply. In all, sixteen lots of pure seed wheat, 12 lots of oats, 39 lots of barley, and 2 lots of mangel seed were sold to farmers in the spring of 1917. One hundred and thirty-six samples of potatoes were sent out, and 93 samples of flower seeds and bulbs were sent to schools, women's institutes, and others. The demand for these has increased rapidly.

EXPERIMENTAL STATION, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. SAXBY BLAIR.

THE SEASON.

April, 1917, was a cold month, with a very heavy precipitation, particularly during the first part of the month. It amounted to 4·12 inches, and as a consequence, very little land could be worked. On a naturally well-drained area at the Station, some roots for seed were planted on 25th and 26th April. During May the temperature continued much below the average, with three frosts, the last being on the 12th. The rainfall of 2·92 inches fell on sixteen days during the month, with the result that all except naturally well-drained lands were unfit to work at any time during the month. The amount of sunshine was much less than normal, and there were few good drying days. The low temperature, continuous rainfall, and lack of sunshine seriously hampered the work of putting in crops, and retarded vegetation generally. The early part of June continued wet, with rain on eight days up to the 13th, after which there was some good weather for putting in crops. The temperature was slightly above that of other years, resulting in a rapid growth of all crops which had been put in. Cropping was late, however, owing to the unfavourable weather, and a large part of the seeding was done during June. Growth, particularly of fruit trees, was retarded by the cold weather, and apple trees, usually in bloom the last of May, were fully ten days later, not being in full bloom until the 14th of June.

The latter part of May and early June, due to the continuous wet weather, was unfavourable for spraying, thus preventing, in many cases, the giving of the necessary early sprays for scab control.

During July conditions were favourable for growth except on very wet land, there being ample rainfall for dry lands, and too much for the low areas which previously had not properly dried out. The wet weather favoured the hay, and a fair to good crop resulted. There was an unusually heavy rainfall on the 28th of 2·12 inches. This was followed by more wet weather during August, the rainfall aggregating 5·15 inches for the month, and many wet areas remained watersoaked for the balance of the season. There was a violent windstorm on the 10th which caused grain to lodge, and did much damage to potatoes and corn. The fruit crop was also greatly reduced, it being estimated that 30 per cent was blown from the trees.

September was generally fine, and early seeded grain produced good yields and was harvested in good condition. Late-seeded grains and potatoes were injured by a heavy frost on September 10, which lessened the average yield very materially.

October was a satisfactory month for fruits, and other crops were harvested in good condition. There was a very heavy precipitation from the 20th to the 25th, 6·77 inches of rain having fallen during this period, causing floods equal to the spring freshets. These excessive rains, with the ground already wet from previous rains, made much fall ploughing impossible, and rendered the gathering of roots a very difficult task.

November was fine but cold, and there were many heavy frosts during the month, but it was possible to plough until the 26th, after which the ground remained frozen.

December was a cold month throughout, the lowest temperature being 7 below zero. A fall of snow on the 2nd made good sleighing, and this continued during the winter. January was cold throughout, without the usual "January thaw". The snowfall was not great, but the small amount that did fall remained, making good sleighing. February was unusually severe, the thermometer registering below zero on ten days during the month, the lowest being 13 degrees. The snow remained until the 26th, when a thaw broke up sleighing in many places. March has also been unusually cold, and a fall of snow early in the month made good sleighing, which continued to the 27th. The only heavy snowstorm of the winter, accompanied by wind, was on the 10th, when considerable drifting resulted. A remarkable feature of the winter was that sleighing continued practically uninterrupted from December 2 to March 27, there being no mild spells of long duration during that time.

METEOROLOGICAL RECORDS.

Months.	Temperature.					Precipitation.					Hours of bright Sunshine.
	Maximum.		Minimum.		Mean.	Rainfall.		Snowfall.		Total.	
1917.	Date.	Deg.	Date.	Deg.	Deg.	Days.	In.	Days.	In.	In. in rainfall.	Hours.
April	23	62	1–2	22	38·4	13	4·09	3	3	4·39	107·6
May	24	63	8–12	30	43·63	16	2·92	.....	.....	2·92	101·7
June	15–21	81	1	34	60·36	11	2·93	.....	.....	2·93	176·3
July	26	87	29	46	65·93	12	3·65	.....	.....	3·65	195·6
August	2	87	10	42	67·67	11	5·15	.....	.....	5·15	202·1
September	27	78	12	31	53·94	8	3·72	.....	.....	3·72	214·7
October	30	76	15–27	29	48·69	12	8·54	.....	.....	8·54	157·9
November	24	55	30	10	33·01	6	2·51	4	4·25	2·935	78·1
December	9	51	17	− 7	19·66	4	1·47	8	30·25	4·49	33·5
1918.											
January	12	43	1–28	− 5	18·16	5	1·23	6	9·50	2·18	81·6
February	26	52	9	−13	17·49	5	2·27	6	11·75	3·445	103·3
March	31	52	8	−13	24·44	2	0·37	8	18	2·17	149·9
Total Annual	.....	.....	.....	.....	.....	.....	38·85	.....	76·75	46·52	1602·3

LIVE STOCK.

Horses.—In addition to the seven draught, one express, and one driving horse reported on last year, a pair of draught horses were purchased in October. This purchase was made necessary because of the additional work resulting from growing turnip stecklings for seed. No feeding experiments have been conducted with horses during the year. A record has been kept, however, of the feeds used, and, during the eight months of heavy work, the grain fed consisted entirely of whole oats, and an average of 18 pounds per day was fed to each horse, with 12 pounds of hay. The oats cost 90 cents per bushel and the hay $12 per ton, making a daily cost of 55·8 cents per horse. The average weight of the draught horses is 1,370 pounds, and even with the above feed, they weighed lighter in the fall after work was finished than in the spring when work started. The winter ration consisted of 13·8 pounds of oats, 12 pounds of hay, and 6·4 pounds of carrots, costing 45·4 cents per day.

Cattle.—The registered Shorthorn stock on hand at the end of the year consisted of 1 herd bull, 14 cows, 2 two-year-old heifers, 6 yearling heifers, 6 heifer calves, and 3 bull calves, making a total of 32 head. Six bulls were sold during the year for breeding purposes. Six cows have qualified in the Record of Performance test. Fourteen cows have completed lactation periods during the year; of these 9 were

mature cows, 2 were three-year-olds and 3 were two-year-olds. The average milk yield for the herd was 6126·9 pounds, testing 4·14 per cent fat, making an average butter yield per cow of 299·17 pounds, and giving an average profit of $49.53 per cow. The milking days averaged 323 for the herd. The daily average per cow was 18·96 pounds of milk.

The average for the twenty-four lactation periods of the Shorthorn cows and heifers at this Station has been as follows: Number of days dry, 72; number of days milking, 304; yield of milk per cow for lactation period, 5,627 pounds; average yield per cow per day, 18½ pounds; pounds of butter produced in each lactation period, 272; value of butter and skim-milk for each lactation period, $110.42; cost of feed from calving to calving, $74.79; profit per cow for period, $35.63.

During the stable-fed period, 1 pound of meal mixture is fed to each 3 pounds of milk produced, and while on pasture 1 pound of meal is fed for each 4 pounds of milk produced. It should be pointed out that the pasturage is limited, and at no time would be considered really good. For grain mixtures, 300 pounds of bran, 200 pounds of ground oats, 200 pounds of cottonseed, and 100 pounds of oilmeal were used for part of the year, but, owing to scarcity of oats, the meal mixture was changed to 300 pounds bran, 100 pounds cottonseed, and 100 pounds oilmeal, which mixture has given satisfactory results.

Steers.—Twenty-six steers bought in the fall of 1916 and sold on the 31st March, 14th and 26th May, 1917, returned the following profit:—

Purchase price, 23,077 pounds at 6½ cents	$1,500 00
March 31, sold 2 steers 2,320 pounds at 9 cents	$ 208 80
May 14 and 28, sold 24 steers 28,546 pounds at 11 cents	3,140 06
	$3,348 86
Purchase price, 23,077 pounds at 6½ cents	1,500 00
Selling price above cost	$1,848 86
Cost of feed for period	1,102 94
Profit from lot	$ 745 92
Average weight of steers when sold	1,187 pounds.
Average weight of steers when bought	887 "
Average gain in weight of steers	300 "

Thirty-one steers were bought from farmers in the surrounding districts in October, 1917, and fed during the winter. Two lots of twelve each were fed alike in every respect except that the succulent feed of one lot was turnips and the other was corn ensilage. The meal ration was started at 1 pound and increased to 5 pounds each per day at the end of the third week, making an average of 4·82 pounds per day per steer for the whole feeding period. Turnips were fed at the rate of 45 pounds, and ensilage 35 pounds each per day. Hay was fed to the amount of 12 pounds for each steer. The meal mixture was made up of 400 pounds bran, 200 pounds cottonseed, and 100 pounds of oil meal to February 1, after which the cottonseed was increased 100 pounds. The roots were valued at $3, ensilage $4, and hay $12 per ton. The meal mixture cost $2.41 per hundredweight.

The steers could have been sold at 10 cents per pound live weight on March 31 at the end of the feeding period, and at this valuation the following profits would have resulted:—

		Turnip lot.	Ensilage lot.
First weight, November 28, 1917	lb.	10,540	10,540
Finished weight, March 31, 1918	"	13,255	13,025
Average gain per steer	"	226·25	207·08
Daily gain per steer	"	1·839	1·725
Total cost of feed for period	$	379 06	382 78
Selling price, March 31, 1918, at $10 per cwt.	"	1,325 50	1,302 50
Total cost, March 31, 1918	"	1,195 91	1,199 63
Profit per lot	"	129 59	102 87

POULTRY.

The poultry department consists of two permanent 100-hen houses, 16 by 32 feet each, seven colony houses 8 by 12 feet each, two brooder houses, one duck house, and a supply house, with an incubator room in the basement. There are three incubators, including the Prairie State, Tamlin, and Cyphers.

Three breeds have been kept during the past year, consisting of 107 female and 9 male Barred Plymouth Rock, 84 female and 7 male White Wyandotte, and 115 female and 10 male Rhode Island Red, making a total of 306 female and 26 male birds.

The feed used consisted of oats, corn, and wheat screenings, which was fed at the rate of 3 quarts to each 25 hens per day. A dry mash consisting of 3 parts bran, 3 parts of ground oats, and one part of meat scrap was before them in hoppers all the time. The green feed was composed principally of mangels.

BEES.

The eight colonies of bees carried through the winter were found to be in fair condition in the spring. The spring was unusually late, however, and the fruit-bloom period was dark and unfavourable, resulting in a small amount of honey being gathered at that time. On the whole, the season was unfavourable for honey production, owing to the much dark weather prevailing. The colonies were prevented from swarming by weekly examinations, and the removal of queen cells. The greatest yield from a single colony was 116 pounds, and from the poorest colony 13 pounds, the average being 55·3 pounds. Black bees only have been kept, and, during the summer three Italian queens were purchased from J. P. Moore, Morgan, Kentucky. These were introduced into hives where the black queens were not prolific. One of these queens proved of no value, making it necessary to unite this colony with one of the other weak ones, thus reducing the number of colonies to seven. The colonies on the average weighed 68 pounds when put in their winter cases on November 3.

FIELD HUSBANDRY.

Owing to the limited area for field crops, and the fields available being taken up quite largely with various other experiments, it has not been found possible to devote certain fields to definite crop rotations. It should be stated, however, that the practice of following clover with a hoed crop such as corn, turnips or potatoes, and this followed by grain and seeding down to clover has been followed in all the fertilizer and other cultural tests. This three-year rotation seems to be the most satisfactory for the land at this Station.

Crop Yields.—The corn put into the silo amounted to 162 tons, the greater part of which was the variety Longfellow, which from tests here would seem to be the best variety to grow to obtain fair yields of well-matured corn. The corn did not mature as well as usual, owing to being planted late and the growth being checked by the wet weather. As a result, the ensilage was not as good as was desired. The yield per acre averaged 11 tons 745 pounds. The turnips were a very inferior crop owing to the area

on which they were planted being too wet and in low fertility. The yield from 5 acres was only 1,785 bushels, an average of 357·7 bushels per acre. This was newly broken land which had previously been in oats, and was very uneven. An area of Banner oats seeded May 21 on an area previously in corn and turnips, yielded 42 bushels and 15 pounds per acre. Areas seeded on new land in low fertility and very wet yielded only 18 bushels and 22 pounds per acre. The total grain yield was 601 bushels. The hay crop on the dyked area of 7 acres was good, having an excellent stand of clover averaging 3 tons 1,596 pounds cured clover hay per acre. The 8 acres on the upper field areas were inferior, producing an average of 2 tons 90 pounds per acre. The total hay yield was 47 tons 1,837 pounds.

FERTILIZER EXPERIMENTS.

The area given over to fertilizer experiments and experiments with pulverized limestone aggregates 22½ acres. Four acres are devoted to an experiment conducted by the Division of Chemistry designed to determine the most profitable quantity of fertilizing materials to use per acre. One and one-half acres are devoted to a test to gain information as to the crop production from different fertilizing materials on land limed and unlimed. Five acres are devoted to an orchard fertilizer test. One acre is employed to test the value of ground dried seaweed as a source of potash, and one acre to test the value of Rito or humatized peat in crop production. In addition to the above, 10 acres are divided into ½-acre plots on which the relative value of slag and pulverized limestone is being determined.

CEREALS.

Experiments with cereals during the year consisted of 1 acre each of Marquis and Red Fife wheat, 1 acre No. 80 barley, and one-half acre each of Canadian Thorpe and Manchurian barley, and an acre each of Banner, Victory, and Daubeney oats. One-quarter acre of Golden Vine and one-half acre of Arthur peas were also grown. The yield of wheat averaged 14 bushels per acre, there being only a difference of 34 pounds in yield between the two varieties. The oats yielded an average of 38 bushels, Banner giving the highest yield. The Daubeney is very early, but otherwise is not desirable. Victory is a very plump oat, and has given returns nearly as good as Banner. Barley has never yielded high at this Station, and, of the three tested, the No. 80 obtained from the Experimental Station at Charlottetown is the most satisfactory. The average yield was 19 bushels per acre. The best field pea is the Arthur, which yielded 26 bushels per acre.

FORAGE PLANTS.

The root plots were grown on an area in a fair state of fertility, the previous crop being clover. The ground was manured the previous fall with 15 tons stable manure per acre and 800 pounds of fertilizer containing 4 per cent of nitrogen and 10 per cent of phosphoric acid, applied after the ground was disced in the spring and harrowed in. The mangels and carrots were seeded May 12, and the turnips May 17. Thirty-three varieties of swede turnips were grown, and they ranged in yield from 1,496 bushels per acre to 712 bushels. Good Luck and Kangaroo, two standard varieties, quite extensively grown in this district, yielded 1,320 and 1,170 bushels, respectively. Five varieties of fall turnips were also grown, of which the White Globe was the most productive, yielding 994 bushels per acre.

Sixteen varieties of mangels were tested and they ranged in yield from 811 bushels per acre to 349. Gate Post, a long, red variety, was the most productive. The Yellow Intermediate, considered one of the best from tests covering a period of years, yielded 759 bushels. The Danish Sludstrup, which has been one of the best yielders here, was not as good as usual and produced only 627 bushels per acre.

Three varieties of sugar beets yielded an average of 477 bushels per acre. An analysis of these would seem to show that they contain an average amount of sugar.

Eleven varieties of carrots ranged from 765 bushels to 441 bushels per acre, the Improved Short White giving the largest yield.

The test with ensilage corn was conducted on a suitable corn area of light loam. The crop was grown in hills 3½ feet apart, a small amount of manure being put under each hill. The yield ranged from 17 tons 1,224 pounds to 10 tons 757 pounds per acre. Early Leaming was the best yielder, followed by Longfellow which produced 17 tons 1098 pounds per acre. The Longfellow matures much earlier than Early Leaming. Golden Glow, a very satisfactory variety, produced 14 tons 934 pounds per acre.

SEED PRODUCTION.

A small area of one-seventeenth acre was planted to Danish Sludstrup mangels grown the previous season. The seed yield was 1,686·7 pounds per acre. The quality of the seed was not as good as that grown in 1916. One-sixth acre of Corning's Lapland turnips yielded 1,108·4 pounds seed per acre. Forty-five acres of land were prepared early in July and seeded to turnips, the stecklings being carried over the winter in pits for planting in the spring of 1918.

HORTICULTURE.

While the area in orchard fruits aggregates 46·7 acres, this is not devoted to orchard only, for, except a strip 4 feet wide at each side of the rows of trees, the land is devoted to field crops. The same system of rotation, namely, clover, hoed crop, and grain is followed on these areas as is practised on the other parts of the farm. During the past season corn, roots, potatoes and beans were grown in a part of the orchard, and the rest was in clover and grass. Following this system, there is no expense in the development of an orchard, except the loss of land which is necessary in keeping the strip 8 feet wide along the trees cultivated.

The orchard trees have for the most part made vigorous growth, particularly the apples and cherries. The plum trees have not done as well as desirable, and so far have produced only a few plums. The peaches kill back more or less every winter, and have made inferior growth. Some trees have borne a few peaches, and, of the varieties fruiting, Mayflower seems to be the most promising. The varieties Wagner, Wealthy, Yellow Transparent, and Cox's Orange apple trees, five years planted, have fruited some this season.

The experimental orchard work has been continued at Berwick, Kings County; Bridgetown, Annapolis county; and Falmouth, Hants county. This work has made it possible to test out different spraying materials and methods of application at these three points, thus gaining valuable information. The results would seem to show that the lime-sulphur spray with arsenate of lead makes a good combined fungicide and insecticide, giving as little foliage injury as any of the sprays tried. One gallon of the concentrated commercial lime-sulphur to 45 gallons of water and 5 pounds of paste arsenate of lead to 100 gallons has been satisfactory for keeping apple scab and insects under control.

The experimental work with vegetables has been continued and some satisfactory data secured. Potatoes were an exceptionally good crop, this being due largely to the ground being a good clover sod which gives ideal conditions for this crop. One acre of Green Mountain, a main crop variety, yielded 325 bushels per acre. An area of Irish Cobbler, an early potato, yielded 388 bushels per acre. The test made with different varieties yielded from 398 bushels per acre as the highest, to 114 bushels as the lowest. The average yield was 237 bushels marketable potatoes per acre. Tests were continued with different strains of a variety, using Green Mountain, Irish Cobbler, and Garnet Chili. Many cultural experiments were also conducted.

The lawns, shrubs, trees, and flowering plants are each year becoming more attractive, and the past season being damp, the lawns remained green throughout the summer and did not dry out as is usually the case owing to the sandy nature of the soil.

FARM IMPROVEMENTS.

Buildings.—Very little addition was made to the buildings during the year. In order to house some of the young stock, owing to shortage in barn space it was necessary to put up a building 40 feet long by 20 feet wide, adjoining the steer barn. This was a shed-roof building 12 feet high in front and 8 feet at the back, the feed being taken in trucks from the steer barn. The inside of the poultry building was sheathed, a living room for the poultryman fitted up, and improvements made in the incubator room.

Clearing Land.—No additional land has been cleared during the past year, and little work has been done toward improving roads or underdraining.

EXHIBITIONS.

An exhibit of farm produce was made at Halifax, Bridgewater, and Yarmouth. The attendance at these exhibitions was large, and much interest was shown in the work carried on by the Station.

AGRICULTURAL MEETINGS.

In addition to addressing meetings of the provincial organizations and agricultural short courses, a series of meetings in the interest of greater production was held in the valley counties during the winter. In addition, many meetings were held in various parts of the province, and the whole took up the greater part of the winter months.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

THE SEASON.

The early part of the winter of 1916-17 was not at all typical of winter weather, there being no great snowfall until the 3rd of February. On the 14th of February the thermometer dropped to 24° and the weather remained very severe for several days. Snow lay on the ground throughout March. During this month two of the heaviest snow storms recorded in the past five or ten years were experienced. The last three days of the month were much milder, and the snow settled rapidly. April was a very changeable month, varying from bright, spring-like to cold winter days. A thunderstorm was recorded on the 21st.

The weather continued unsettled throughout May. From the 10th to the 30th rain was recorded on fourteen different days. Seeding commenced on the 30th of May, being thus long retarded by the dull rainy period. June was also cold and backward. The growth of vegetation was very slow until the 12th, after which time it came on rapidly. Potatoes and roots were planted about the 16th. July was exceptionally fine. A temperature of 85° was recorded on the 18th. August was somewhat unsettled. September was an excellent month for the harvesting of all crops, grain and corn being stored in first-class condition. October and November were unsettled. High tides, with heavy winds, prevailed on the 1st of October; dykes were washed away and marshes flooded. During the latter half of October a heavy precipitation was recorded. Two inches of snow fell on the 27th of November. This made the harvesting of roots very difficult and very little fall ploughing was accomplished. December was very severe, with heavy snowfalls. Typical winter weather continued throughout January and February, and a great depth of snow covered the ground. Cold, stormy weather was experienced during the first part of March, but towards the end it became very spring-like.

METEOROLOGICAL RECORDS.

Month.	Temperature.		Precipitation.			Total Sunshine.
	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	
1917.	Deg.	Deg.	Inches.	Inches.	Inches.	Hours.
April	59	20	3·23	2·00	3·43	104·90
May	57	28	3·55	.....	3·55	97·30
June	82	32	2·72	.....	2·72	120·70
July	85	35	1·38	.....	1·38	192·70
August	84	47	5·15	.....	5·15	204·60
September	78	29	0·90	.....	0·90	198·50
October	69	29	8·05	.....	8·05	147·00
November	58	3	3·51	2·00	3·71	90·90
December	49	−16	0·50	39·00	4·40	64·30
1918.						
January	39	−18	0·81	15·00	2·31	96·00
February	50	−23	1·82	12·00	3·02	88·90
March	49	−18	0·25	23·00	2·55	140·80
Total for the year	.....	.....	31·87	93·00	41·17	1,546·60

LIVE STOCK.

Horses.—Fourteen horses are kept on the Nappan Farm at present; these include ten heavy draught horses of which four are pure-bred Clydesdale mares. Only one was bred, namely, Fancy Lass (Imp) (31537) (34423). She dropped a nice filly on May 20, 1917. There are three lighter horses suitable for express, cultivating, light harrowing, etc. Data on the cost of feeding horses, also raising colts are being compiled.

Dairy Cattle.—The "Grade-up" experiment has now completed its sixth year. The object of this work is to show the value of a pure-bred sire from high producing dams and sires on the average dairy stock of the country. It is interesting to note as the experiment progresses that the results in most cases are satisfactory, but sufficient date have not yet been compiled from which to draw definite conclusions. The percentage of heifers dropped in the spring of 1918 was much greater than any previous year, which will facilitate the work very much. One of the most outstanding features brought out in the experiment is the necessity of judicious as well as liberal feeding of dairy cattle in order to realize the greatest profit from same.

Sheep.—Two flocks of sheep are kept at Nappan, consisting of a flock of pure-bred Shropshires and a grade flock of Leicester ewes with some Shropshire blood. The Shropshire flock is made up of eighteen ewes and ten shearling ewes, four pure-bred Shropshire flock is made up of eighteen ewes and ten shearling ewes, and four pure-bred ewes. The lamb crop for the spring of 1917 was very satisfactory, and at the time of writing the crop for the spring of 1918 is about 120 per cent. All ram lambs from the pure-bred flock will be sold for breeders. The object of the grade flock is to experiment in the value of a pure-bred sire on common grade stock in grading up a flock of profitable sheep.

Swine.—Two breeds are kept at Nappan, namely, Berkshires and Yorkshires, the total on hand March 31, 1918, being four Berkshire sows and two boars, eight Yorkshire sows and one boar. Only fair returns were realized from these during the year. As for the previous year, the Yorkshires gave the more satisfactory returns.

The herd of ten grade sows purchased in March, 1917, gave good returns and proved good mothers. At the time of writing they are proving much better as two-year-olds than as yearlings.

Some thirty-odd young pigs from the grade sows were fed during the season, part with self-feeders and part hand-fed; also two lots on different feed mixtures, but the results are only from one year, and therefore are not sufficient to draw any conclusions from. This may be said, however, that those fed with the self-feeder did somewhat better than those fed by hand, but they consumed considerably more feed. This work will be carried on for two or three years at which time more definite results can be given.

POULTRY.

Only fair results were obtained from the poultry during the season. The spring of 1918 has been somewhat better for early hatches than was that of 1917 and up to the time of writing the hatches have been good, but with only fair returns from the chicks put under brooders.

Four breeds are kept at Nappan, namely, Barred Rocks, White Wyandottes, Rhode Island Reds, and White Leghorns. The number of each kept through the winter months was as follows: Rock hens 54; Rock pullets 53; Wyandotte pullets 7; Rhode Island Red pullets 20; White Leghorn hens 52; White Leghorn pullets 51; Males: Rocks 9; Wyandottes 1; Rhode Island Reds 1; and Leghorns 7.

Six incubators were used during the spring, namely, three Prairie State; two Nonpareil, and one Cyphers. The first hatch came off on March 16. The percentage of fertile eggs and chicks hatched per breed were as follows: Barred Rocks 78·9, and 36·2, Wyandottes 88·8 and 40·8, Rhode Island Reds 56·4 and 23·8, White Leghorns 85·9 and 42·5 per cent, respectively.

In testing for winter egg production it was found this winter that the old hens, especially in the case of Rocks, did somewhat better than the pullets. Possibly this can be accounted for by the very severe winter.

BEES.

The past season, so far as weather conditions and pasturage were concerned, was a very poor and unsatisfactory one for apiary work. Until May 25 the weather was most unfavourable, being very damp and cold. Bees did not get more than one or two flights per week. The brood in the brood chamber got slightly chilled. From that until the 20th of June conditions were slightly better and after that date some very suitable weather was experienced.

Fifteen hives were put in the cellar the previous fall. Three died during the winter; consequently, only twelve were put on stands for the summer. Five new hives were added to the apiary, making a total of seventeen good, strong colonies for the summer.

The seventeen colonies produced, in extracted honey, 824 pounds during the season, or an average per colony of 48.47 pounds. The largest yield for one colony for the season was 97 pounds.

Counting loss, cost of sugar fed, etc., the average value of the production for the season, per colony, spring count, was $7.67. The experiment of wintering bees on different stores and under different conditions was continued as in previous years, namely, fifteen colonies were put in the cellar of the Superintendent's house. These were divided into five groups of three each, and fed as follows: (1) all sugar syrup; (2) half sugar syrup, half clover; (3) half sugar syrup, half golden rod; (4) all clover; (5) all golden rod. Group 6 was left out of doors, and banked well with snow. This group, which was fed on half sugar and half fall honey, showed the least dysentery of all. Only one colony was lost, and that from group 6. Group 1 in cellar on all sugar came through the winter in the best condition, and was possibly the strongest of all.

FIELD HUSBANDRY.

Rotations.—Three rotations are being operated at the Nappan Farm, namely:—

Rotation "B" (five years): First year roots, or corn; second year, grain seeded down; third year, clover hay, fall ploughed; fourth year, grain, seeded down; fifth year, clover hay, ploughed in autumn.

Rotation "C" (four years): First year, roots or corn; second year, grain, seeded down; third year, clover hay; fourth year, pasture, fall ploughed.

Rotation "D" (three years): First year, roots or corn; second year, grain, seeded down; third year, clover hay, ploughed in autumn.

Rotations "B" or "D" are most suitable where plenty of rough pasture is available. "C" is an excellent rotation for a dairy farmer or any one keeping a large herd with insufficient pasturage.

Crop yields.—The total area in grain, including test plots was 45·88 acres, of which there were 3·38 acres in wheat, 3 acres in barley, 4 acres in mixed grain, 5½ acres in buckwheat and 30 acres in oats. The average yield of these was: 24 bushels 28 pounds; 15 bushels 39 pounds; 25 bushels 36 pounds; 21 bushels 5 pounds, per acre; and in oats the 13 acres in rotations yielded an average of 40 bushels 28 pounds. The 17 acres new land, first crop, yielded 15 bushels 6 pounds. The wet season was very unfavourable for barley; consequently, it was nearly a total failure. There were also 10 acres sown to green feed for dairy cattle.

In roots and potatoes there were 15 acres, 13½ in turnips and 1½ in potatoes. The average yield per acre was 885 bushels 8 pounds and 288 bushels 8 pounds, respectively.

Five acres of ensilage corn yielded 86 tons 1,429 pounds or an average of 17 tons 285 pounds.

Hay on upland, of which there was 31 acres, yielded an average of 1 ton 1,603 pounds per acre. Fifty acres of marsh yielded an average of 1 ton 883 pounds hay per acre.

FERTILIZER EXPERIMENTS.

A comparison is being made among plots receiving one and two fertilizing elements and complete mixtures in order to ascertain the quantity and proportionate composition of the most suitable fertilizer, which will also give the greatest profits. Experiments are also being carried on with ground limestone with different quantities per acre, and while there are yet only one year's results to draw conclusions from it may be said that the effect which ground limestone has on the catch of clover the first year is most marked. The application ran from 1 to 5 tons per acre.

CEREALS.

Thirteen varieties of spring wheat were tested in duplicate plots of one-sixtieth of an acre each, the highest yield being obtained from White Fife, 29 bushels 30 pounds per acre; and the lowest from Bishop, 18 bushels per acre.

In barley there were twelve varieties tested in duplicate plots, but the birds injured the plots so badly that the crop was not worth harvesting.

Fifteen varieties of oats were tested in duplicate plots, the same as the wheat. The highest yield obtained was from Pioneer, 50 bushels 17 pounds; the lowest from Daubeney, 28 bushels 17 pounds.

Five varieties of buckwheat were tried, the best returns being obtained from Rye, 27 bushels 38 pounds. Japanese yielded the lowest, 21 bushels 42 pounds.

In the six varieties of peas, Solo gave the highest yield, it being 15 bushels 30 pounds. English Grey gave the poorest yield, 11 bushels 30 pounds.

Field Crops of Grain.—The barley was very poor. The wet, cold, backward spring made the crop nearly a failure at Nappan. The yields ranged from 12 bushels 24

pounds to 19 bushels, French Chevalier doing the best. Wheat filled only fairly, Huron being much superior to either Red Fife or Marquis. They ranged in yield from 16 bushels 30 pounds for Marquis to 23 bushels 30 pounds for Red Fife. Huron yielded 18 bushels. All oats filled very light. They ranged in yield from 39 bushels for Ligowo to 46 bushels 17 pounds for Banner. Only the wheat and oats were cleaned by fanning mill and hand-picked to sell, in limited quantities, for seed purposes to farmers.

FORAGE PLANTS.

Thirteen varieties of Indian corn were sown on June 14 in duplicate test plots of one hundredth of an acre each. The highest yield came from Compton's Early, averaging 21 tons 1,100 pounds. The lowest yielder was King Philip, 10 tons 1,750 pounds. This year Longfellow, which has for the past five years given an average yield of 14 tons 1,559 pounds per acre, could not be obtained. Hence Compton's Early was sown as the field crop, and the average yield per acre was 17 tons 218 pounds.

Out of thirty-six varieties of turnips, which were tested in duplicate plots the same as the corn, the highest yielder was MacDonald's Perfecta, 1,090 bushels per acre. The lowest was Carter's Imperial, 640 bushels per acre.

The season was very late for mangels; therefore, the yields are not very high. Swiss Charm gave the best returns, yielding 880 bushels per acre, with Golden Tankard at the bottom with only 391 bushels per acre.

Seven varieties of carrots were tried, the highest producer being Improved Short White, 535 bushels per acre. The lowest was Giant White Vosges, yielding 295 bushels per acre or 7 tons 750 pounds.

Only three varieties of sugar beets were tested, and the largest producer was Italian sugar beet, 370 bushels or 9 tons 100 pounds per acre. Home Grown Seed was the lowest, 339 bushels or 8 tons 950 pounds per acre.

Some 20 acres were sown to turnips for stecklings, as experiments of previous years have demonstrated that good root seed could be grown in this district. However, the season was very late and the land was not all cleared consequently, the date of sowing was not until very late, the 1st of August. Notwithstanding these facts the stecklings grew nicely. Some reached four to five inches in diameter, but the majority were only one to two inches. The backward fall made the harvesting of them very difficult, and as severe frosts set in very early the most of them were caught in small piles in the field, just as they had been pulled and piled to sweat before pitting. Though the winter was most favourable for them in this condition they did not keep very well, but sufficient to plant 16 acres for seed production was saved. These will be planted as soon as the ground is at all fit.

All the Grimm alfalfa sown June 16, 1916, was winter-killed the second winter. Seventy-five per cent went the first winter. It would appear that the thawing and freezing in the early spring has a great deal to do with winter-killing of alfalfa in this district.

HORTICULTURE.

Fruits.—Large fruits, especially the apple crop, were not as good as for previous years, but the quality was somewhat better. Very little scab was in evidence. The most troublesome insect pest was the Canker worm. This holds equally true throughout the surrounding district. In many orchards where they had not spraying appliances the foliage was destroyed throughout the whole orchard, much loss being sustained thereby. The winter varieties at Nappan were much better than the fall varieties. Frost during the early blooming period would account for a decrease in the crop yield. This affected the early varieties much more than the later ones.

Strawberries.—The strawberries wintered well and made very strong growth after mulch was removed and kept up quite late. Hence blossoming was retarded somewhat, no injury was realized from the late June frosts and a good yield was the result.

Bush fruits.—These came through the winter in good condition, with the exception of gooseberries, which killed out badly. The frost seemed to heave them out and bare the roots. Raspberries did exceptionally well; also currants. All these are new plantations and some valuable data may now be gotten from their yields.

Shrubs.—All shrubs on lawn came through the winter of 1917 in splendid shape, and made a strong growth during the season, but during the winter of 1918 the heavy fall of snow did much damage to all trees and shrubs, in that many were badly broken down and the trees split. It also spoiled the appearance of many of the nice hedges.

Perennials.—The perennials wintered and made strong growth during the season.

Annuals.—The majority of the annuals were started in hotbeds between the 4th and 10th of April, but owing to the unfavourable weather conditions for hotbed work, the weather being very cold and wet with very little sunshine for weeks at a time, the germination and growth were only fair, and much damping off was experienced. However, those that survived and were planted in the open made splendid growth, and these, with the perennials, gave a most profuse bloom in the border from early spring to late summer.

Garden.—The season was anything but favourable for early gardening, especially on the heavier soil. It was after the middle of May before the land was in a condition to work at all. Even after the seeds were sown, germination was very slow, as the ground was very cold. Therefore only fair returns were realized.

Besides the cultural garden work and testing of varieties, the work of endeavouring to improve the strain of a few of the best varieties of potatoes was continued as in the previous season. The varieties used in this work are Irish Cobbler, Carmen No. 1, Wee McGregor, Empire State, Rawling's Kidney, and Green Mountain. The results from this work are very encouraging, as a marked improvement, not only in yield but in quality, is being noticed between the selected and unselected.

FARM IMPROVEMENTS.

Buildings.—A new model piggery, suitable for the average sized farm, was started late in the season, but owing to unfavourable weather conditions and the early frosts the inside was not completed, but will be completed next season.

The building is 30 x 68 feet, with a good cement foundation all around, averaging 12 inches thick and 3 feet high. It has plank frame with a straw loft and feed storage room overhead; single boarded and 2-inch battens over cracks. On the inside on studs there is one ply of half-inch boards on which is placed one ply of linofelt paper covered with $\frac{7}{8}$ sheathing. The ceiling is sheathed. The floor will be made of No. 1 Portland cement, with drainage from each pen leading out into one manure pit. In the main part there are ten pens 10 feet 10 inches by 10 feet. The partitions are made of $1\frac{3}{4}$-inch finished lumber, 3 feet high. A litter carrier was installed which passes over the centre of each row of pens. At the northwest end a feed room 15 feet 10 inches by 28 feet is partitioned off from the main part. In this room a cooker will be built and a pair of platform scales erected, which will facilitate the carrying on of experiments in feeding pigs. The building is well lighted and ventilated, and when completed will make an up-to-date model piggery, as well as a great addition to the buildings at Nappan.

The rough shed erected for steers last year was enlarged and is now just twice the size, making a shed 20 feet by 80 feet with 7-foot posts in front and 5-foot posts at the back. It is single boarded, battened, and covered with paroid roofing, having four pens 20 feet by 20 feet divided by plank partitions. A long trough goes the full length of the north side of the building, and the steers are fed through a shutter opening on the north side. Doors 4 feet by 6 feet 6 inches open to the south into small yards into which the steers may run. This will house thirty-two steers comfortably, though thirty-four were wintered there last season.

All buildings were gone over and doors and windows repaired where necessary and roof patched where leaks were noted. This is necessary for the proper maintenance of any building. Moreover, it is more economical to keep the buildings in good repair all the time than to let them get so bad that a general overhauling is necessary.

Fencing.—A new pole fence was erected all around the 50-acre wood lot at the east end of the Farm. In all there were some 8,000 poles laid. All line fences were repaired where it was found necessary.

Clearing new land.—The clearing of new land by prisoners of war was continued. They were worked right from the first of April through the season as the weather permitted up to December 1, 1917. The remainder of the brush was burned off the 25 acres that was chopped out of forest during April, 1917, and north of the main driveway through the Farm. Then this land was stumped, piled and the piles burned early in the fall, so that all this land will require is one more going over with picks and shovels, the small roots taken out and the high hills levelled off, and it will be ready for ploughing. The 41 acres on the south side were also cleared of small roots and burned and prepared for the growing of stecklings.

Drainage.—A large open ditch 5 feet at top and 2 feet wide at the bottom was cut from the north side of the Farm to the south side between the new fields that have been cleared in order to drain the low, boggy swamp. The length of the ditch was about 2,100 feet. Before the season was over the effect of the drainage was most noticeable, and will be very useful in keeping these fields dry. Another small surface ditch was cut south of the 26 acres of new land cleared in 1916 and next to the Roach property south of the Farm, which is now in woods. The size of this ditch was 1,500 feet long, 2½ feet wide on top and 8 inches at the bottom. It has helped very materially to drain this new land and to keep it dry.

Four acres of rotation field B3 were underdrained during the early fall, and two acres of B4. This was laid with 3-inch tile drain 30 feet apart. The remainder of B3 will be completed in the spring, as the ground got too soft to finish it in the fall. The 6-inch main into which these tiles empty, and which runs from the southwest to the northeast through the low gully in B4, was completed, namely about 600 feet. A large 6-inch tile main was laid through the swamp of the new 41-acre field that was cleared during 1916-17. This runs from about the centre of the field at the north side to the southeast corner, a distance of about 1,600 feet. This drain is proving very effective in draining the swamp.

Barnyard.—The major portion of the barnyard was stoned during the season to a depth of 8 to 12 inches, with large stone for a foundation and smaller stone on the surface. The latter was well broken up, making the surface fairly smooth. On this will be spread a light coat of gravel during days that the teams are not busy on other farm work. Some 600 tons of stone were hauled into the yard. This will make a permanent job, and certainly is much better for the dairy stock.

Roadmaking.—As in previous years a certain amount of time was spent in encouraging the improvement of roads and helping to keep them in a better condition for traffic, not only on the main driveways of the Farm, but also on the public highway, from the Farm to the stations, that is to Nappan Station, and Maccan Station. Two bridges that were in bad shape were repaired, and the split-log drag was put over the road several times during the season, especially after heavy rains. This aided much in keeping the roads in shape. The main driveway of the Farm was extended to the back of the lot through the newly cleared fields east of the Farm.

EXCURSIONS AND VISITORS.

Six excursions were held at the Farm during the season. The largest one was that held by the Cumberland County Farmers' Association, the attendance of which was approximately 3,000 people. Many small parties visited the Farm at various times during the season, and the approximate number of visitors would be 4,500 people.

EXPERIMENTAL STATION, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

THE SEASON.

The winter of 1916-17 began on the 14th November with a snowfall of 7 inches, followed by a drop in temperature on the 15th to four degrees below zero. Most of the snow disappeared later, and though there was a fall of 18 inches through December, it was blown about, and heavy rains left the fields practically bare, and though January was exceptionally severe there was no blanket of snow for the fields until the 21st of that month. February brought a good snowfall and steady cold weather. This snow blanket continued into early April, which month was cloudy, and there was practically no spring-killing of grasses and clovers. May was frosty and cloudy, the soil remaining wet and cold, and there was no growth whatever during the month. June was wet and cold, resulting in thousands of acres throughout the province remaining uncropped. Some sowing and planting was done in July, a month which gave fairly good conditions for crop growth. Rain, mist and fogs were prevalent through August, spoiling, more or less, late hay and greatly damaging grain and potato crops. September was bright and dry, but crops did not recover. They were, however, harvested in good order.

There was frost on September 8 which did much damage in low-lying sections, but little effect of frost at the Station was seen till October 15. October was continously wet, and potato and root harvesting was much delayed. November brought cold weather on the 7th, and the ground never again thawed; consequently, considerable areas of roots were frozen in. December followed with the record for the coldest ever experienced in New Brunswick. The ground was well covered with snow. Unusually severe cold and rough weather has continued until March 31.

METEOROLOGICAL RECORDS.

Month.	Temperature F.			Precipitation.			Total Sunshine.
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	
1917.	°	°	°	Inches.	Inches.	Inches.	Hours.
April	37·9	64·0	16·0	2·46	16·0	4·06	136·90
May	44·1	64·0	25·0	3·07	0·0	3·07	115·95
June	58·9	79·5	36·0	5·10	0·0	5·10	153·85
July	70·2	90·0	45·0	2·31	0·0	2·31	180·20
August	63·7	90·5	39·0	6·00	0·0	6·00	195·65
September	53·2	80·0	29·0	1·05	0·0	1·05	201·75
October	44·1	65·0	28·0	4·06	0·0	4·60	125·25
November	28·4	49·0	− 1·0	1·54	0·2	1·56	101·00
December	9·8	37·0	−27·5	0·00	12·0	1·20	83·15
1918.							
January	8·0	35·5	−27·5	0·00	32·0	3·2	98·80
February	10·27	48·0	−25·5	1·1	23·0	3·4	89·95
March	20·5	53·0	−26·0	0·00	36·0	3·6	155·35
Total annual	.....	.....	.....	27·23	119·2	39·15	1,637·80

LIVE STOCK.

Horses.—Two pure-bred Clyde mares, five grade Clyde mares, three Percheron grade mares, three grade draught geldings, and two general-purpose mares were worked on the Station during the year. Twelve colts, from weanlings to two-year-

olds, were reared. A cheap winter ration was fed to two idle horses, costing, from January 1 to April 1, $8.33 each. Each horse weighed exactly the same at the end of the period as at the beginning. The food cost of rearing draught colts from birth to three years old has been found to range between $90 and $100.

Dairy cattle.—Pure-bred herds of Dairy Shorthorns, Holsteins, and Ayrshires are kept, the bull calves being sold for stock improvement and the heifers added to the herd. In the grading-up experiment, seven half-bred Holstein heifers calved during the year, and thirteen half-bred Dairy Shorthorn heifers were reared to breeding age. Half-bred Ayrshire heifers are coming on one year younger. Most of the foundation cows of mixed breeding that were bought in 1914 have yearly improved in their production. One small cow of unknown breeding closed a milking season of 500 days with a food cost of $107.25 and total value of products of $276.82.

Beef cattle.—The work with beef cattle was confined to the feeding of three lots of very common steers from 1st November to 1st March, to ascertain the relative profit of grain feeding, liberally and lightly, and feeding hay and roots only. The pen on liberal grain feeding sold at $9.64 per 100 pounds, gave a profit per head, above cost of feed, of $5.08; that on light grain sold at $9.30 per 100 pounds, and gave a profit per head of $2.47; and that on hay and roots only sold at $9.22 per 100 pounds, and gave a profit per head of $2.65. The purchase price of the different pens was identical.

A small bunch of five steers was raised on the Station and up to two years old cost $80 each for food consumed. They average 914 pounds in weight, worth approximately 10 cents per pound.

Sheep.—The small flock of Shropshire has done well. Eleven lambs were raised, the rams sold and the ewes retained. Fifteen grade Cheviot and Leicester ewe lambs were purchased for crossing with the Shropshire ram.

Angora Goats.—A flock of eleven Angora goats was added to the Station stock in December, with a view of demonstrating their efficiency in brushing new land. With one exception, they have wintered well, though they seemed to suffer somewhat during very severe cold.

Swine.—Five pure-bred Yorkshire sows and a boar were received from the Central Farm. The sows were bred, and were wintered in cabins in the barnyard, fed principally on raw mangels, with some boiled potatoes, middlings, and oats They have done well. Three young grade sows were also bred and wintered.

POULTRY.

The average number of birds in the flock was 180, comprising 26 Barred Plymouth Rocks, 89 Rhode Island Reds, 43 White Leghorns, and 22 White Wyandottes. The health of the birds was good throughout the year.

The number of eggs laid during the twelve months was 17,670, or an average of 97·6 per bird, selling for $3.23. The cost of feed per bird for the year was $2.68, showing a profit of 55 cents per bird per year, disregarding labour and interest on capital.

Incubation results for the season were fair, in spite of the adverse spring.

BEES.

Three colonies were put in an outside wintering case, and two colonies in individual cases in the bee house in the fall of 1916. Two colonies were taken from the outside case and one from the bee house in good condition in the spring. Two swarms were taken and two new colonies formed by division. The season was very poor for honey gathering. The largest amount of honey taken from a single colony was 65¾

pounds. The total taken was 212¼ pounds. The average weight per colony, spring count, was 64·08 pounds, with an average value of $11.85 per colony. Two colonies were afterwards united, and all colonies were fed syrup for winter stores, and again packed in winter cases in the same way as the preceding winter.

FIELD HUSBANDRY.

No rotation experiments have yet been started at this Station. Seeding and all field work were delayed by wet weather till the third week in May. The acreage sown to grain was as follows: wheat, 3 acres; oats, 24; buckwheat, 3½; winter rye, 1¼; peas, 1; beans, three-quarters; and barley, one-third of an acre. The wheat crop, in common with most wheat in the district, was ruined by a bacterial affection of the glumes and stalks, known as "Glume Spot," and the yield was 9½ bushels of shrunken grain per acre.

Oats were poor, yielding only 24 bushels per acre.

Buckwheat blighted badly, and barley was a failure.

Winter rye gave an excellent sample, and yielded 35 bushels per acre; while Yellow Eye and Small White beans yielded 20 bushels per acre.

With the exception of 2 acres, only land which had not been underdrained was available for field roots, and it was impossible to get it ready for seeding before July. This land was afterwards flooded and some of the crop entirely destroyed. The acreage worth harvesting averaged in one field 470½ bushels, and in another 413 bushels, per acre; while one acre of Invicta swede on underdrained land, gave 1,260 bushels. Mangels, on similar land, fertilized in the same way, gave 537 bushels per acre. Seeding for both crops was on June 2.

Like the root crop, the potato crop was much injured by wet, as only a small portion was on underdrained land. The average yield was only 170 bushels per acre. The crop was, however, sound, and kept exceedingly well in the cellar.

The acreage for silage corn was reduced on account of the wet season; seeding was late in June and growth was slow. The varieties were Wisconsin No. 7 and White Cap Yellow Dent. Ears were only just formed when the crop was cut.. The area was 7¼ acres and the yield 87 tons (12 tons per acre). The silage kept well, however, and fed satisfactorily. Seven acres of peas, oats, and vetches were grown, and also put in the silo. The yield was 4 tons per acre, and made good silage. Thirty-two acres in hay gave a yield of 78 tons 878 pounds.

FERTILIZER EXPERIMENTS.

The second year of the experiment on seaweed fertilizer with ten plots of one-twentieth acre each was conducted with wheat seeded with clover, but as the wheat was practically ruined by Glume Spot, the record of yields was very low and inconclusive.

Experiments "A" and "B," occupying seventy-six plots of one-twentieth acre each, to ascertain the minimum quantities of each fertilizing element that can most profitably be used, were on the third year of their rotation, and the experiments are, therefore, complete. The analyses and results of these experiments are reported upon by the Supervisor of Investigational Work with Fertilizers.

To ascertain the fertilizing value of a substance known and sold as "Rito," and to check some of the results from experiments "A" and "B," twenty additional plots of one-twentieth of an acre each were planted to potatoes.

In vegetable growing the comparative yields from heavy manuring versus light manuring combined with chemical fertilizers corroborated the work of previous years in showing that larger yields and earlier maturity can be obtained at much less cost, by a combination of chemical fertilizer with manure, than by the application of manure only.

CEREALS.

The usual variety tests with wheat, oats, barley, and peas were continued with five varieties of each on quadruplicate plots of one-sixtieth of an acre each. The yields were very low, due to seasonal conditions, including late seeding and the prevalence of bacterial diseases. In wheat, Huron gave the best yield, with 14 bushels and 52 pounds per acre; in oats, Victory, with 28 bushels per acre; in barley, O. A. C. No. 21, with 17 bushels per acre. The peas did not ripen sufficiently to get an intelligent estimate, let alone an accurate statement, of their comparative yields.

FORAGE CROPS.

Twelve varieties of Flint corn and thirteen varieties of Dent corn were tested on plots. The Flint variety giving the largest yield of stalks and ears for silage was a strain of Quebec Yellow with 15 tons 1,000 pounds per acre, and the Dent variety giving the largest yield was Golden Glow with 19 tons per acre. The only varieties to ripen grain were, Native New Brunswick Yellow, Free Press, and Quebec Yellow. The most mature Dent variety was North-west Dent on which the kernels were quite firm with a yield of 16 tons 1,750 pounds per acre. Fourteen varieties of mangels were tested, Tankard Cream giving the best yield with 20 tons 440 pounds per acre. Of four varieties of sugar beets, Royal Giant gave the best crop with 16 tons 1,120 pounds per acre. Of eleven varieties of carrots, Mammoth White Intermediate gave the best yield with 21 tons 240 pounds per acre. Forty varieties of turnips were tested. Among the swedes the largest-yielding variety was Ditmar's Bronze Top, with 25 tons 880 pounds per acre, and the smallest was Canadian Gem, with 13 tons 1,720 pounds. Of the white turnips, Cowhorn was best with 27 tons 900 pounds per acre. A plot of Thousand Headed kale gave a yield of 19 tons 1,600 pounds. Broad Leaf Essex rape yielded 16 tons 1,000 pounds, and Dwarf Essex rape 15 tons 600 pounds per acre at one cutting. With the exception of a four-year-old plot of the Ontario Variegated strain, all the alfalfa seedings were rendered practically valueless from winter-killing.

Growing Turnip Seed.—When information was received that the Experimental Farms system was expected to co-operate in meeting the shortage in root seeds for 1919, 46 acres of sod land were prepared as rapidly as possible for the growing of turnip stecklings. This acreage was seeded from the 25th July to 6th August, and 500 pounds per acre of 3:10 fertilizer was applied in the drill. Growth was disappointingly slow and, in an effort to give these little turnips all possible time for growth, unsually cold weather at the end of October froze them in and, with the exception of one day later, it was impossible to pull them. Experiments in covering with straw before the snow came and at different times during the winter and spring have been tried to see how they can best be brought through the winter. At this date it is certain that those under straw, put on before snow came, have wintered well. As large an acreage as possible will be devoted to seed raising in 1918.

FIBRE PLANTS.

An acre of flax was grown for fibre, and gave a yield of 3,560 pounds of long staple straw, pronounced excellent for fibre purposes. A plot of hemp gave a yield at the rate of 24,000 pounds per acre.

HORTICULTURE.

Fruits.—All tree fruits and small fruits have done well during the year. There has been no loss observable on the 31st March from winter-killing, and wood growth was vigorous in 1917. Most of the vacancies were filled among the apple trees, and two each of fifteen new varieties were planted for test in the variety orchard. The apple crop was very light but all small fruits, with the exception of strawberries, gave large yields.

Vegetables.—Variety tests were continued with vegetables, and good yields obtained except with beans and squash. Potatoes were grown on between thirteen and fourteen acres. Two acres were devoted to testing strains of Green Mountain and Irish Cobbler received from 300 different farmers, an acre and a half to planting for disease investigation, five acres for the growing of seed of pure varieties, one acre to secure cost of production data, one for spraying experiments, one under fertilizer tests, an acre and a half for variety and cultural tests, and some early potatoes for the Bermuda seed trade and table purposes. The yields were low in all cases, and the cost of production high. The cost of production acre in 1917 gave a yield of only 173 bushels at a cost of $141.88, while, in 1916, a yield of 330 bushels was obtained at a cost of $89.02.

Ornamental Gardening.—Roadside trees, clumps of shrubbery, specimen trees, windbreaks, and hedges were planted quite extensively and successfully. The season, while unfavourable for most crops, was favourable to tree growth. A large number of trees and shrubs were distributed for the school grounds in various parts of the province. What was left of the original nursery was transplanted to new ground.

FARM IMPROVEMENTS.

Buildings.—The potato cellar was enlarged, and a concrete top to replace the pole and earth covering put on. Upon this was moved a barn 30 by 40 feet in size, and a room fitted up in this to permit the carrying on of investigational work with potatoes during the winter.

A three-room dwelling was fitted up, and the buildings kept in order by general repairs.

Fencing and Draining.—Temporary fencing was erected with woven wire to take the place of barbed wire, on account of the addition of sheep to the live stock of the Farm, but no permanent fencing was done.

Slightly over 2,000 feet of heavy open ditching was done, to make it possible to proceed with the clearing of land and to reclaim pasturage. Five thousand feet of clay and cement tile were laid to enable the cropping of additional wet land. The method of ploughing in narrow ridges and clearing out the dead furrows with a horse-drawn ditcher was followed, where necessary, in the absence of underdrainage.

Clearing Land.—A large amount of stone was removed from land newly broken and cropped last year and two acres additional were brought into crop. No expenditure was made on stumping, but thirty acres were brushed and burned and made ready for pasture.

Roadmaking and Grading.—Only at such times as the weather prevented work on the land, was any labour put on the roads. Some excavating was done for the laying of driveways, and stone was hauled to be broken and distributed. Gravel was obtained and distributed on the Farm roads where most needed, and some concrete culvert work accomplished.

EXHIBITIONS.

No large shows were held in New Brunswick during the year, but a portion of the Station exhibit was sent to the local fall fair at Centreville in September, to the annual potato show at Woodstock in January and to the provincial seed fair at Fredericton in March. Literature was distributed in considerable quantities at each show mentioned, and the attendants kept busy in discussing questions and giving information.

EXCURSIONS.

On Labour Day the Farmers' and Dairymen's Association arranged, in conjunction with the Station, to hold a conference, and about 1,600 visitors attended; of these 1,200 partook of a lunch provided by the Station and prepared and served by the Fred-

ericton Women's Institute. Mr. Thos. Hetherington, Provincial Live Stock Superintendent, demonstrated on dairy cattle and sheep and addresses were given by Hon. J. F. Tweeddale, Prof. W. S. Blair and the Superintendent.

The field crop judges for the province met at the Station to practise their work and early in October the Provincial Normal School students visited the Station in a body.

In March, the members of the Farmers' and Dairymen's Association of New Brunswick spent an afternoon at the Station when addresses were given by Prof. J. W. Mitchell, Assistant Commissioner of Agriculture for Canada, upon dairy cows; by G. C. Cunningham, plant pathologist, and by the Superintendent.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIERE, QUE.

REPORT OF THE SUPERINTENDENT, JOS. BEGIN.

CHARACTER OF SEASON.

The winter of 1916-17 was dry and very cold until the end of March. The snowfall was the heaviest recorded for a number of years, and was late in disappearing in the spring. The first work on the land at the Station was done on April 26, and by the last of the month about ten acres of wheat and other grains had been sown on well-drained land. May was rainy and cold until the 26th, and it was only after that date that spring work on the land was general in the district. Some fine weather early in June permitted of a certain amount of seeding being done, but this was followed by three rainy weeks so that seeding operations were kept back until the last of the month. The rainfall for the months of May and June was 10·3 inches, falling on twenty-eight different days, and the hours of sunshine for these two months gave an average of only 5·4 hours per day. In short, the spring of 1917 was extremely unfavourable for seeding, and had a marked effect upon the area sown that year. July was a fairly favourable month, but growth would have been more rapid had the temperature been higher. August was very rainy and unfavourable to haying operations, which were performed with great difficulty. September was the best month of the season in spite of nine days of rain. Part of the grain harvesting was done during this month. On September 10 and 11 a frost damaged some of the unripened grain in many places. It is seldom that a frost occurs so early in this district. October was very rainy and unfavourable to saving the remainder of the grain crops, the getting-in of the potatoes, and the harvesting of the roots. The winter months of 1917-18 have established a record for a heavy snowfall and steady cold up to March 31.

METEOROLOGICAL RECORDS.

	Date.	Temperature.				Precipitation.					Hours of Sunshine.
		Maximum.	Date.	Minimum.	Mean	Rainfall Inches.	Snow Inches.	Total Inches.	Number of days.		
									Rain.	Snow.	
April.....	23	53·7	11	12·6	34·1	1·61	7	2·31	7	5	138·05
May.....	31	71·1	5	29·8	42·0	3·64	.....	3·64	15	.....	159·12
June.....	14	81·2	9	55·0	54·6	7·68	.....	7·68	13	.....	168·44
July.....	31	89·2	2	40·2	61·6	2·29	.....	2·29	8	.....	241·53
August.....	1	90·7	30	36·6	59·7	3·63	.....	3·63	15	.....	218·27
September.	19	77·7	30	32·4	50·6	1·18	.....	1·18	9	.....	209·08
October....	19	70·4	25	31·0	41·3	5·56	.....	5·56	12	.....	84·37
November.	1	43·0	29	1·2	27·0	0·08	13	1·38	2	6	109·32
December .	21	39·4	29	26·8	14·2	0·04	13	1·34	2	6	91·46
1918.											
January....	7	34·6	27	27·0	8·6	.....	28	2·80	.....	10	87·10
February...	20	45·8	6	28·0	7·4	1·50	19	3·40	2	13	90·41
March.....	31	45·8	4	6·6	19·1	0·22	6	0·82	2	5	213·22
Totals.....	.....	.....	.....	.....	.....	27·43	86	36·03	87	45	1,810·37

LIVE STOCK.

Horses.—There are at present on the Station sixteen heavy draught horses made up of four good Percheron mares and twelve heavy grade horses; also one French-Canadian mare, and two Percheron colts one year old. The Percheron mares were bought with the double purpose of helping in the work on the Station and of carrying on experiments in the breeding of pure-bred Percherons. This breed seems to have a promising future in this district where there are already several fine specimens. Two Percheron colts were brought up during the year, one having been bought with its mother at the age of forty-five days. Circumstances permitting, the colts were not weaned until seven months of age. The cost of raising the colts necessarily includes the cost of keeping the mother during the seven months before the colt was weaned.

For the information of the reader, the prices of feeds upon which the cost is based are given. The price is an arbitrary one and serves as a basis for establishing the cost of raising and keeping the different classes of live stock. The average price really paid for feed during the year is also given. These prices are: grain, bran, and chop, 1¼ cents; hay, $7 per ton; roots and ensilage, $2 per ton; whole milk, $1.60 per hundredweight; skim-milk, 20 cents per hundredweight. The average price of feeds for the year are: grain, bran, and chop, 2⅓ cents per pound; hay, $12 per ton; pasture for cattle was charged at the rate of $1 per month, and for horses, $2 per month.

Cost of maintenance of a Colt bought when forty-five days old: Feed consumed by the mother during five months of nursing, 1,888 pounds of grain and chop; 1,975 pounds of hay; 2½ months' pasturage. Feed consumed by the colt from the date of weaning to 31st of March, that is, seven months: oats, 579 pounds; bran, 624 pounds; chop, 309 pounds; hay, 2,234 pounds; whole milk, 75 pounds; roots, 676 pounds. From this it would appear that the cost of raising the colt up to the time of weaning was $35.51, and from the date of weaning until March 31, $28.60, or $63.11 in all; the prices of feeds being those arbitrarily fixed. At the average prices paid for feeds in 1917-18, this colt cost $101.93 for feed. The weight of its mother was 1,750 pounds. The colt weighed as follows at the ages indicated: at three months, 590 pounds; at six months, 795 pounds; at nine months, 990 pounds; and at twelve months, 7,175 pounds.

The Cost of a Percheron Filly born April 11, 1917, up to the 31st of October.—For the upkeep of the mother during the nursing period; oats, 901 pounds; bran, 683

pounds; chop, 100 pounds; hay, 2,384 pounds; pasturage, 4½ months. Feed for the colt from November 1, that is the date of weaning, up to March 31: oats, 478 pounds; bran, 448 pounds; chop, 152 pounds; whole milk, 71 pounds; roots, 497 pounds. From this it would appear that, based on the arbitrary cost of feed as given above, the total cost for raising this colt for the year was $58.33, and at the actual prices paid for feed during the year the total cost was $94.58. The weight of the mother was 1,775 pounds. The colt weighed, at six weeks, 350 pounds; at three months, 540 pounds; at six months, 785 pounds; at nine months, 960 pounds; and at the end of the year, 1,125 pounds.

It will be noted that in the above cases the total cost of keeping the mare during the nursing period is charged against the colt, as this was the sole duty performed by the mother during the above period. It was believed that this extra charge would be more than compensated by the strong growth of the colt so necessary for its perfect development.

The cost of maintenance of twelve heavy horses employed in heavy work at the Station was carefully kept. The total cost of feed amounted to $915.76 for the twelve, or $76.31 per head per year, or 20·9 cents per head per day. The total number of hours of work for the twelve horses was 32,892, and the average 1,991 hours per horse for the year, and a daily average of 6.5 hours per horse. Each hour's work, therefore, cost 3.8 cents for feed. The above figures are based on arbitrary cost values of feeds. At the average prices actually paid last year, the total cost would be $1,595.32 for the year for twelve horses; $132.94 per horse; 36.4 cents per head per day. At this price an hour's work would cost 6.67 cents.

Two light horses, employed in garden and express work, cost 31·6 cents per horse per day for the seven months, April to October, and 15·9 cents per day for the five winter months; the reduction in cost during the winter being due to reduced rations of grain and hay, compensated for by feeding straw and roots. As showing that the horses thrived well during the winter on these reduced rations, it may be said that on November 1, the total weight of the horses was 2,380 pounds, and on March 31, 3,475 pounds. For roots, turnips, beets, and carrots, were fed, the last named being apparently preferred by the animals, although the beets were well enough liked.

Dairy Cattle.—These comprise fifteen pure-bred Ayrshires; ten cross-bred cows, and three grades with Ayrshire blood. The young stock comprise eight Ayrshire heifers from six to thirty months of age, and four Ayrshire grades of similar age, nine calves less than six months, and two mature Ayrshire bulls. Two Ayrshire cows and four young bulls of the same breed were sold during the year.

Milk Production.—Twenty-four cows completed their lactation period during the year, with a total production of 145,621 pounds of milk, or an average of 6,068 pounds per cow. This return is fairly satisfactory when it is remembered that four young heifers completed their first lactation period and four others their second. The average yield of butter-fat for the herd was 4·1 per cent; the total production of butter-fat being 5,970·46 pounds for the herd, or a total butter production of 7,024 pounds; an average yield of 292·7 pounds of butter per cow.

Cost of raising a Heifer.—In order to ascertain the cost of raising a heifer up to the time of the birth of her first calf, details have been kept with care for each calf raised. At the arbitrary prices used for feeds, the average cost of raising each heifer works out at $65.78 per head. Last year, however, at the average actual prices paid for feed, the cost of raising amounted to $97.17. The average weight of the heifers at two years old was 884 pounds.

Beef Cattle.—Three steers, with some Ayrshire blood, were kept in order to establish whether there was any profit in raising these animals and marketing them at about one year old. The main experiment in view was to use as little milk as possible

in order to see whether the common calves generally sold in the district for veal might be more profitably kept and sold later as beef. The total cost of feed for these steers amounted to $82.23. Each pound of gain in weight cost 5·264 cents. The steers were sold at 8·567 cents per pound, and the net profit per pound of gain was 3·203 cents; the prices of feeds being the arbitrary ones referred to above. On account of the prices paid last year, however, each pound of gain cost 8·075 cents, so that there was barely ½ cent per pound of grain profit. It would seem from this experiment that only a very small profit can be expected from the sale of young beef animals of light weight and of the dairy breeds. Doubtless, with the beef breeds the result would be different.

Swine.—A good boar and six good sows of the Yorkshire breed were wintered out-of-doors in simple cabins, and in spite of the exceptionally low temperatures, they always seemed to be comfortable. No experimental feeding work was done owing to the difficulty of procuring suitable feeds.

Sheep.—One ram, seven ewes, and six lambs of the Shropshire breed form the present pure-bred stock, and seven cross-bred lambs will be used as the basis of a flock of cross-bred Shropshires. Sixteen lambs were sold at an average price of $11.95 each, the average weight of fleeces was 6·7 pounds and wool sold at 55 cents per pound.

Poultry.—White Wyandottes and Barred Plymouth Rocks were kept. Three hundred layers were divided into six lots, and experiments were carried on to determine the values of different grains in feeding laying breeds. Two hundred and eighty pullets were raised during the year, and one hundred and twenty of these were selected to form a flock for winter laying; the remainder were sold at the average price of 27 cents per pound.

Bees.—Twenty-seven colonies were placed in the bee cellar in the winter of 1916, and all wintered well except one. Eight colonies wintered in the open in wintering cases came out stronger in the spring than those wintered in the cellar. Those outside consumed an average of 12·4 pounds of feed during the winter, while those in the cellar consumed an average of 13·8 pounds. Different experiments were carried on with the bees, such as determining the best feed to give them during winter, the prevention of swarming, and the increasing of the workers in each colony. The average honey yield of each colony was the lowest record yet, on account of the extremely unfavourable weather at the time of the honey flow, although the daily production was the highest ever noted. The reason for the above is that in this section the period of honey flow is so short that each day of unfavourable weather lessens by a considerable amount the total production.

FIELD HUSBANDRY.

Rotations.—Four regular rotations were carried on, including the cultivation of forage plants, the growing of grains for seed, and the production of hay from leguminous and grain-bearing plants.

Roots and Ensilage Corn.—In all the rotations provision is made for the production of roots and ensilage corn. The average yield of the latter for the last four years has shown that the climate in this district does not allow a heavy yield, but its cultivation is less expensive than that of roots and permits of an indirect preparation of the soil for the following crop, while at the same time giving a fair yield as a rule.

Compared with roots, the results of the past four years have shown that in this district one may expect a heavier yield of nutrients than is the case with ensilage corn. The cost of growing the roots, however, is considerably higher. The average yield for ensilage corn for the year was 12 tons 850 pounds per acre and 22 tons 400 pounds per acre for the roots.

Grain Crops.—On the regular rotations the average yields were as follow:—

	Bush.	Lb.
Marquis Wheat	41	45
Huron Wheat	43	20
Banner Oats	66	8
Daubeney Oats	63	12
Success Barley	31	15
Manchurian Barley	38	6

Clover hay yielded a little better than the average, and hay on two-year-old meadows gave about an average yield.

HORTICULTURE.

Orchards.—Some twenty-eight varieties of fruit trees were planted in the experimental orchard. In general the trees made an excellent growth of new wood which ripened well. The fruit crop was below the average. Owing to the difficulty in getting the necessary amount of skilled labour, the experiments with vegetables were suspended during the year, the only ones carried on being those dealing with varieties of potatoes and the different cultural methods to be pursued in growing these along with certain spraying experiments.

SPECIAL CROPS.

Twenty-five acres of roots were sown in July for the production of stecklings. The growth of these was slow at first, but was very good in August and September. The total crop of stecklings was estimated as sufficient to plant from forty to fifty acres for seed production next year. The stecklings were pitted from the 8th to the 15th of November during very unfavourable weather.

An acre of flax for fibre was grown, and one-tenth of an acre of hemp. The yield was excellent, and was shipped to Ottawa for treatment.

GENERAL NOTES.

Tile-drainage work was not carried on during the year with the exception of the laying of 2,500 feet of collecting tile. The surface drainage was improved over a large area of low land.

Twelve acres of new land were stoned and placed under cultivation, the stones being used for making approaches to the Farm buildings.

Farm exhibits were shown at St. Damien, Montmagny, St. Pascal, Rivière-du-Loup, Sandy Bay, and Murray Bay. Material was also furnished the representative of the Canadian Government for certain expositions in the New England States.

Three farmers' excursions from different sections of the district, totalling some 3,800 visitors in all, visited the Station. Those taking part in short courses, and members of the Council of Agriculture, as well as numbers of other groups, from time to time also visited the Station.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, G. A. LANGELIER.

CHARACTER OF SEASON.

The six months during which plants make their growth in central Quebec, May to October, inclusive, were colder, wetter and duller than the average for the last six years, the mean temperature being, respectively, 55·68° and 56·60° F., the precipitation 30·34 and 24·59 inches, the number of hours of sunshine 902·8 and 1,075·3. The season without frost was shorter than usual, the last one occurring on May 16 and the first one on September 23, which left only 130 free days. Of the different crops

grown in the district, hay, plums, currants, gooseberries, lettuce, celery, ornamental plants and perennials were very good; corn for silage, wheat, strawberries, cabbage, were a little above the average; oats, barley, apples, cauliflower, cucumbers, squash, melons, onions, garden peas, garden beans, annual flowering plants, somewhat below the average; swedes, tobacco, raspberries, sweet corn, potatoes, tomatoes, peppers, egg plants, Brussels sprouts, poor. The main characteristic of the season was the unusually long wet and dull spells.

METEOROLOGICAL RECORDS.

—	Temperature F.			Precipitation.				Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	Heaviest in 24 hours.	Total.
1917.	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
April	56·0	10·0	35·25	1·19	1·00	1·29	0·22	114·3
May	77·0	28·2	46·2	2·55	1·00	2·65	0·95	153·6
June	80·0	42·2	59·5	8·56	.....	8·56	0·90	136·4
July	89·0	51·2	67·3	3·19	.....	3·19	0·74	212·4
August	92·0	44·2	65·92	6·69	.....	6·69	0·76	192·2
September	77·0	29·2	53·4	2·47	.....	2·47	0·73	162·3
October	70·0	30·2	50·1	6·78	.....	6·78	1·56	45·9
November	42·0	− 3·0	25·78	0·34	9·40	1·28	0·30	83·8
December	38·0	−34·7	8·36	0·12	31·00	3·22	0·60	54·9
1918.								
January	32·0	−31·7	5·12	.....	34·00	3·40	1·00	38·1
February	44·0	−34·7	6·08	1·10	24·50	3·55	0·85	64·3
March	44·0	−10·0	19·88	0·25	25·00	2·75	0·65	143·6
Total	.....	.....	.....	33·24	125·90	45·83	.....	1·401·8

LIVE STOCK.

The live stock kept in very good condition throughout the year.

DAIRY CATTLE.—The herd is composed of 48 head, forty-two of which are pure-bred, and six grade, French Canadians. They are kept for five purposes: Supplying milk to the dairy, experimental breeding, experimental feeding, experimental housing, and to distribute high-class breeders at reasonable prices.

Milk production.—Eleven heifers and cows, ranging in age between 3 and 12 years, finished a lactation period during the fiscal year. Their total production was 65998·5 pounds of milk, testing 4·35 per cent butter-fat, which is equivalent to something like 305 pounds of butter per animal. This is an average of about 700 pounds of milk or 50 pounds of butter more than the previous year.

Experimental Breeding.—Out of nine grade cows bought for this purpose only two proved profitable producers and not one of their heifers, by a scrub bull or by a pure-bred bull of unknown ancestry, was a very good milker. This shows that both the sire's dam and the dam must be good producers to give profitable offspring.

Experimental Feeding.—There are four projects: whole milk versus skim-milk and supplements for calves, feed requirements of heifers until calving time, extra good versus average rearing of heifers as influencing size, type and also production of the mature cow, and unlimited versus limited meal for dairy cattle.

Whole Milk versus Skim-Milk and Supplement for Calves: All the feed given to nine calves was weighed until they were twenty-four weeks of age. Calculating hay at $7 and silage or roots at $2 per ton, whole milk at $2, skim-milk at 25 cents, commercial calf meal at $4, home-made calf meal at $3.65, and ordinary concentrates at

$2.50 per hundred pounds, the results of one year show that the average cost of feed was $52.80 for each of the "whole milk" calves, $17.86 for each of the "skim-milk and commercial calf meal" calves, and $16.81 for each of the "skim-milk and home-made calf meal" calves. Each of the three latter received, on an average, the following quantities of feed during the twenty-four weeks: 89·5 pounds of whole milk, 2,322 pounds of skim-milk, 266 pounds of concentrates, 220 pounds of hay, 103 pounds of roots, 15 pounds of silage. The average weights at birth were, respectively, 67, 70, 66 pounds, and at twenty-four weeks 371, 295, 290 pounds. This experiment will be continued for a few years, but the results of one year show that even if the youngsters are heavier and sleeker, whole milk is too costly to use until calves are twenty-four weeks old; also that there is practically no difference between the commercial and home-made calf meals. The home-made meal consisted of 6 parts corn, 3 parts oats, 1½ part flax seed, by weight, all ground together.

Feed requirements of Heifers until calving time: The following feed valuations are given because they were used from the start to the finish of the first experiment, but they were changed in 1917 for the calves which were born that year: whole milk, $1.50, and skim-milk, 20 cents per 100 pounds; meal, 1¼ cent per pound; hay, $7; green feed, roots, silage, $3 per ton; pasture, $1 per month. The results show that for each of four heifers it cost, on an average, for feed alone, $64.60 to bring them until calving time at 27 months and 25 days, when their weight was 798 pounds. During that time each of them had received 892 pounds of whole milk, 7,553 of skim-milk, 764 pounds of meal, 2,910 pounds of hay, 5,590 pounds of roots, 6,074 pounds of silage, 181 pounds of green feed, and had been ninety-four days at pasture. With more pasture available, the cost would have been somewhat decreased.

Extra good versus average Rearing of Heifers as influencing Size, Type, also Production of the mature Cow: Twins were chosen for this experiment so that the results will not be influenced by the breeding of the animals. These heifers were dropped on June 6, 1916 and on April 1, 1918; when they were 21 months and 25 days, the one which had been highly fed weighed 785 pounds and had cost $54.59 for feed alone, at the valuations given in the preceding paragraph, whilst the one which had been reared about as at the average farmer's place weighed 600 pounds and had cost $36.05. These heifers will be followed until they are mature cows, and it will be interesting to note the influence of rearing on each of them.

Unlimited versus limited Meal for Dairy Cattle: This experiment has now run five years in succession, during winter, and as the cows used for it were practically all spring calvers, it explains the small profits over feed. Animals were chosen of nearly the same weights and production, and they all received the same quantities of hay, straw, silage, and roots. As records were kept very accurately for twenty-seven cows, it is presumed that the following figures are fairly conclusive. The average for five years shows that each cow of the lot receiving as much meal as would be eaten, which was one pound per 2.18 pounds of milk, gave a profit over feed of $15.26 in 147 days, each cow of the lot receiving one pound of meal per 4 pounds of milk gave a profit of $14.22, and each cow of the lot receiving 1 pound of meal per 8 pounds of milk gave a profit of $14.19. The valuations were as follows: hay, $7; roots and ensilage, $2 per ton; meal, 1¼ cent per pound; butter, 28 cents per pound; and skim-milk, 20 cents per hundred pounds. These valuations were used in 1913, when the experiment started, and it was thought best to keep them right through. The results show that it pays to feed well.

Experimental Housing.—Buildings, nowadays, cost so much to erect and keep in good shape that the interest and depreciation eat up a good part of the profits. It is thought that, for cattle, only the cows in milk and calves need to be housed in expensive constructions, whilst bulls, young stock, and dry cows can do very well in cold quarters. Since 1915, the bulls have been kept all the year around in single-boarded sheds, with open fronts to the south; not only did they do well, but one old animal,

especially, who had got very sluggish when inside, proved to be a much surer sire after having been out during a whole winter. In future, all heifers will be raised in these open sheds, from the time they are from four to eight months of age until a couple of weeks before they are due to calve.

Selling breeders at reasonable prices.—The three bulls used, all bred at the Station, are out of dams which have qualified for the Record of Performance, and there are more cows at Cap Rouge which have this distinction than in any other herd in Canada. Young stock from such foundation would be desirable even at high figures, but as only medium prices are charged, it is easy to see that the farmers of the district derive great benefit from this.

Horses.—There are now 27 horses, including 23 registered French Canadians, three draughters and a driver. They are kept for five purposes: work on the farm, experimental breeding, experimental feeding, experimental housing, and to distribute high-class breeders.

Work on the Farm.—During the year, each horse averaged over 200 full days of ten hours, leaving aside the unbroken colts. As five mares raised foals, this is a very good record. The cost of horse work, per hour, is now extremely high, and it behoves all farmers so to plan their operations that the working stock is advantageously employed during as many days as possible through the year.

Experimental Breeding.—Three projects are under investigation: close breeding, raising fall colts, work versus no work for brood mares.

Close Breeding: A mare has now raised two foals, a filly and a colt, by her son, and in each case the youngsters weighed less at birth, at six months, and at a year than others by the same sire out of unrelated dams of about the same weight. This will be continued with the same mare, also with another one whose son will be old enough for service in 1919.

Raising Fall Colts: If it was practicable to have mares drop their young in the autumn, there is no doubt that the dams could do much more work during the year. However, mares do not always come in heat in the fall and also they are more liable to miss at that time. But there have been colts raised in the autumn, so that it is not an impossibility. Two mares dropped, one a colt and the other a filly, in the fall of 1916; both youngsters have done very well, though at first, possibly on account of the close confinement in the stable during winter, they did not seem to start well. That they have overcome this initial disadvantage is shown by the fact that the colt weighed 1,040 pounds at 18 months, the average weight of his sire and dam being 1,285, whilst the filly weighed 775 at the same age, the average weight of her sire and dam being 1,200.

Work versus no Work for brood Mares: The same mare raised a filly three years in succession and they are all doing very well, though one year the dam was worked carefully until foaling time, the next year she was kept idle in a box stall until about a month before dropping her young, when she was put to medium work, and the last year she was kept outside, with only a single-boarded shed as a shelter, until four or five weeks before foaling, when she was put to medium work. It is probably better to work a mare carefully until she foals, but farmers who cannot do so should not, by this fact alone, be deterred from raising horses.

Experimental Feeding.—There are two experiments in regards to the quantities of feed required to rear a young animal until he is ready to earn his living, and as to the quantities of feed required during a year by a work horse.

Feed required to raise Horses: All feed given to a colt and two fillies was weighed until their average age was 34 months and 7 days, when they were broken and ready to earn their living. The quantities consumed by each were 13,063 pounds hay, 4,278 pounds oats, 4,830 pounds bran, 29 pounds wheat, 5 pounds oil cake meal, 1,036 pounds skim-milk, 29 pounds whole milk, and they had very little pasture. It cost $161.34 for

each of them for feed alone. Valuations of feed were decided upon before prices went up, and it is thought better still to use the old figures, though anybody can, with the quantities stated, calculate what it will cost at other valuations; they were as follows: whole milk, oats, oil cake meal, 1.5 cent per pound; wheat, 2 cents per pound; bran, 1 cent per pound; skim-milk, 20 cents per 100 pounds; hay, $7 per ton. These young horses were very well grown, as their average weight at less than three years was 1,310 pounds, whilst the average weight of their sires and dams is only 1,275 pounds.

Feed required for Work Horses: All feed given to two mares was weighed during one year and the number of hours which they worked was recorded. Their average weight was 1,210 pounds at the beginning of the experiment and 1,220 at the end. Each one of them ate 4,440 pounds of hay, 4,770 pounds of oats, 972 pounds of bran, 132 pounds of common molasses, and worked 1,639 hours, so that every hour of labour cost about 10 cents for feed alone, calculating hay at $10 per ton, oats at 2½ cents, bran at 1½ cent, and molasses at 3½ cents per pound, which were the average prices during the year. If interest, depreciation, barn room, shoeing, blanketing, harnessing, doctoring, and care are taken into consideration, it is easily seen that horse labour is very costly; but it should not be cut down by giving less feed, as long as none is wasted, but rather by making the labour more effective, and especially by having more of it during the year. It is very likely that if the two above-mentioned mares had worked 50 per cent more hours, which was possible, it would not have taken probably more than 10 per cent extra feed.

Experimental Housing.—All colts are raised in single-boarded sheds at this Station, from the time they are weaned until they are broken. During five years, fifteen different young horses were wintered outside, and though the temperature went down as low as 34° F. below zero, not a single one was ever seen to shiver. The doors of the sheds are kept open day and night, except possibly four or five times a year during heavy storms. These colts generally commence to shed their hair earlier than the horses kept inside, they are always healthy, owing to the pure air, and have strong limbs due to the exercise. These advantages more than counterbalance the little extra feed required to keep the bodies of the animals warm.

Selling breeders at reasonable Prices.—The stud of French Canadian horses at Cap Rouge is, without the least possible doubt, the largest and best in existence to-day. About half a dozen youngsters are raised each year, and some of them have been shipped to Ontario, New Brunswick and Nova Scotia, besides Quebec.

Sheep.—The flock comprises a three-year-old-ram, six yearling rams, seventeen breeding ewes, nine shearling ewes, and twelve lambs, or a total of forty-five, all pure bred Leicesters. They are kept for experimental feeding, experimental housing, and to sell breeders at reasonable prices.

Experimental Feeding.—The work undertaken is to find out just how much feed it takes to winter a breeding ewe. Leicesters of a little above medium size are kept at Cap Rouge, and the figures are for females, most of which were carrying young. For an average of two years, feed given daily to each animal during the two hundred days between good grass in the autumn and in the spring, was as follows: 3·09 pounds hay, 0·23 pound pea straw, 1·79 pounds swede turnips, 0·87 pound oats, 0·60 pound bran. The total number of ewes thus fed was 28. Calculating hay at $10 per ton, straw at $5, swedes at $4, oats at 3 cents per pound, and bran at 1½ cent, it would cost $10.95 per head for feed during the winter.

Experimental Housing.—The breeding ewes are wintered in a single-boarded shed with the front, facing south, always open. When lambing very early, they are sometimes brought to the sheep barn, but when the youngsters are from two to six days old, they go back to the shed, with their mother, even if it is in March. And March, in central Quebec, is often as rigourous as January in many parts of Ontario.

Selling breeders at reasonable Prices.—Leicesters are very popular in central Quebec, and a great many orders, especially for rams, have to be refused each year. What is sent out is first-class stock which should, and will, no doubt, improve the flocks of the district.

POULTRY.

About three hundred Barred Rock hens were wintered in 1917-18, but as a great number were sold after the incubation season, the average number kept during all the year was 181. They laid 14,900 eggs, or about 82 per hen. From 4,128 eggs, 537 chicks were raised to marketable age, which means that it took more than seven eggs for a chick. There were 15 per cent of the eggs which were not fertile and 56 per cent of the fertile eggs did not hatch, whilst 65 per cent of the chicks died or were taken away by crows, hawks, foxes, or other rodents. Much better results should, and will, be had at this Station. Poultry is kept for experimental breeding, experimental feeding, experimental housing, and to distribute good stock. Egg preservatives are also compared.

EXPERIMENTAL BREEDING.—This consisted in comparing pullets with hens as breeders, also as producers of winter and of hatchable eggs.

Pullets versus Hens as Breeders.—It is generally thought that the eggs from pullets are not as good for breeding purposes as those from hens. The results of two years at Cap Rouge show that there is practically no difference, even if late birds are included amongst the pullets. The difference, though small, was against the hens. It is, however, wise to wait a few years before forming a decided opinion regarding this.

Layers of different Ages.—Four pens of 25 birds each were used during the months of November, December, January, February, three years in succession, with the result that, on an average, the cost of production of eggs was the lowest for the early pullets, it being 18 per cent larger for the yearling hens, 413 per cent for the old hens, and 928 per cent for the late pullets. This experiment will be continued, but it corroborates the advice generally given not to keep old hens nor hatch chicks too late.

Heavy versus light Layers as Breeders.—Contrary to expectations, the results of two years show that the eggs from the heaviest layers produced the greatest number of living chicks. The pens used produced, respectively, during four months, 348, 143, 90, and 55 eggs, and the percentages of chicks hatched from the fertile eggs were 64·3, 62·7, 60·2, and 59·5.

EXPERIMENTAL FEEDING.—There are four experiments to compare different kinds of feeds and watering: skim-milk versus beef scraps, roots versus clover, commercial grain versus separator screenings, water versus snow.

Skim-milk versus Beef Scraps: All feed was the same for both pens, with the exception that one received skim-milk and the other beef scraps. The average of two years shows that during November, December, January, and February, the twenty-five birds in the "skim-milk" pen produced $6.72 worth more of eggs and meat (increase in live weight) than the others. This is important, as dairy by-products are available on nearly every farm

Roots versus Clovers: Everything fed to two pens was the same, excepting that one received sweedes and the other dry clover leaves. The results were practically the same, as the "swedes" pen was only 21 cents ahead of the other at the end of the experiment.

Commercial Grain versus Separator Screenings: Two pens of twenty-five birds each, of about the same ages, were fed alike except that one received commercial grain and the other screenings from the fanning mill, such as any farmer who cleans his

grain for seed would have on his place. The average of two years shows that, valuing the screenings at two-thirds the price of the commercial grain, the latter were $5.82 ahead during the four winter months.

Water versus Snow: Both lots of twenty-five birds received the same quantities of feed, whilst one of them had water and the other snow. The pen which had water for the four winter months, during two years, was $1.72 ahead of the other. This experiment will be continued.

Experimental Housing.—The range of temperature, averaging the winters of 1916-17 and of 1917-18, was 38·8° F. outside. 25·4° in a colony house 8 feet wide, 23·9° in a laying house 12 feet wide, and 23·6° in a laying house 16 feet wide. All styles of houses were of the ordinary shed-roof pattern, and had twice the area of cotton as of glass in the front. These records will be gathered for a few years more.

Distributing Good Stock.—Eggs, young chicks and breeding stock are sold each year at prices current in the district. It is very easy to start with good stuff in poultry without incurring heavy expense. Gradually farmers are changing their scrub hens for pure-bred ones, and the flocks, besides looking much better, are more uniform and bring higher profits. Nothing but first-class eggs or birds are sold for breeding purposes, the rest being disposed of for consumption.

Egg Preservatives.—For two years, eggs have been preserved at this Station in different ways: wrapped in paper and left alone, wrapped in paper and turned daily, in oats, in sawdust, in lime-water, in water-glass. Samples of each lot are sent to the Chemistry and to the Poultry Divisions at Ottawa, to be tested, and are also tried at Cap Rouge. The lots preserved in sawdust and in paper were not fit for consumption; the lot preserved in oats was suitable for cooking purposes only; the lot preserved in lime-water was the second best, and the lot kept in water-glass was of very good quality for stored eggs.

BEES.

The bees kept at this Station are hybrids between Italians and blacks. They are kept for commercial and for experimental work.

Commercial Work.—The production of honey from thirteen colonies was 872 pounds, or an average of about 67 pounds per hive. It sold for $105 or a little over 12 cents per pound, which is somewhat more than $8 per colony. The highest yield from one hive was 93 pounds and the lowest 18. The colonies ranged in weight from 61 to 73 pounds, averaging 65, after feeding, when put in the cellar, on November 2, 1917, whilst they ranged from 33 to 60 pounds and averaged 45 pounds, without the covers, when they were taken out in the spring, on April 23, 1918.

Experimental Work.—During two winters, some colonies have been fed with early-gathered honey, others with late-gathered honey, others with early-gathered honey and sugar syrup, and others with only sugar syrup. Contrary to expectations, the first mentioned did not come out of the cellar in better shape than the others; in fact, the lots fed on sugar syrup alone were about the strongest. This will be continued for a few years yet.

FIELD HUSBANDRY.

Work for this Division comprises crop management, soil management, and agricultural engineering.

Crops, Rotations and Experimental Work.

Crop Yields.—In the district they were lower than usual, with the exception of hay, and at the Station they were as follow:—

Crop.	Yield per acre in pounds. 1917.	Average.	For
Longfellow Corn	18,235	17,039	6 years.
Good Luck Swedes	16,782	29,375	6 "
Timothy Hay	4,650	3,261	6 "
Clover Hay	5,837	3,983	6 "
Banner Oats	1,377	1,575	6 "
Manchurian Barley	1,085	1,109	4 "
Huron Wheat	1,733	1,718	3 "

Cost of production of field crops.—Since 1913, inclusive, accurate records have been kept for 70 acres, for the three main crops of the district, swede turnips, oats, and hay. It is easy to see how an increase in yield lowers the cost per acre, and *vice versa*, as shown in the table:—

1917, AVERAGE FOR 5 YEARS.

Crop.	Yield per acre.	Cost.	Yield per acre.	Cost.
	Lb.	$ cts.	Lb.	$ cts.
Good Luck swedes	16,782	5 98 per ton.	29,960	2 82 per ton.
Banner oats	1,377	0 54 per bush	1,944	0 37 per bus.
Timothy and clover hay	5,329	5 81 per ton.	4,613	5 68 per ton.

Rotation of Crops.—A three, a four and a six-year rotation have now been compared for seven years in succession. Each of these rotations has a hoed crop, followed by oats and then by hay for one, two or four years, according to the length of the rotation. Contrary to expectations, the most profitable one has been the six-year rotation, followed by the four-year, and then the three-year. This work will be continued to throw more light on the subject.

Experimental Work.—This has consisted in comparing different rates of seeding oats, also of seeding timothy with clover, of recording the yield of hay when the nurse crop had been sown at different rates, also the yield of hay after different kinds of grain.

Rates of seeding oats: Thirteen different rates, going up by a quarter of a bushel from 1 to 4, inclusive, have been tried during the last five years. The average for all was 1,868 pounds per acre: for the six rates below 2½ bushels, 1,760 pounds per acre; for the six rates above 2½ bushels, 1,929 pounds per acre; and for the standard rate of 2½ bushels, 1,914 pounds per acre. The latter should be adhered to until new light is thrown on the subject by a few more years' experimentation. This experiment has always been conducted on a sandy loam of good fertility.

Rates of seeding timothy and clover: Since 1912, inclusive, 126 plots of one-sixtieth acre each have been used for the experiment, on half of which 12 pounds of timothy, 8 pounds of red clover, and 2 pounds of alsike were sown per acre, with oats as a nurse crop, whilst the others only received half of these quantities. The thick seeding gave 8 per cent more hay. The soil is a sandy loam in very good heart and under a three-year rotation. This would tend to show that on land kept in shape by proper tilth and fairly well manured, it is not as important to sow large quantities of clover and grass seed as on poor soils badly worked.

Yield of hay when nurse crop is sown at different rates: For five years, oats have been sown at thirteen different rates from 1 to 4 bushels per acre, and the hay weighed the next year from each plot. The average crop of hay following the seedings above 2½ bushels was 3,583 pounds per acre, that following the seedings below 2½ bushels was 3,418, and that following the standard rate of 2½ bushels per acre was 3,588.

Yield of hay with different nurse crops: Since 1912, inclusive, all the trial plots, 252 in number, were seeded down to timothy and clover. After barley, the crop of hay averaged 4,516 pounds per acre, after wheat 4,374, after peas 4,192, and after oats 4,011. This will be continued for a few years more, especially to check the results with peas.

Soil Management.—The only experiment so far undertaken is in regards to the difference between spring and autumn ploughing in the cost of production and the yield of a crop of corn for ensilage.

Spring versus autumn ploughing for ensilage corn.—It is generally thought that spring ploughing is better for corn, especially if a sod is turned just before putting in the crop, so that there may be decaying vegetable matter to warm the soil and give easily available food to the young plants. But in a district where the season is very short, as much work as possible must be done in the autumn. Half of a field of about nine acres was thus ploughed in the autumn and the other half in the spring. The yield on the part ploughed in the autumn was at the rate of 9 tons 462 pounds per acre, and from the part ploughed in the spring 8 tons 1,854 pounds. Moreover the piece ploughed in the spring cost $55.18 more than the other, mostly due to the weeds which required more work.

Agricultural Engineering.—A great deal of work was done during 1917 at clearing land, draining, fencing, roadmaking.

Clearing Land.—Clumps of trees, bushes along fences, boulders, rocky and shaly mounds were cleared away. This facilitates the use of implements, and leaves no harbouring places for weeds.

Draining.—About 4,225 feet of tiles were laid, especially in newly cleared land near the Transcontinental railway; also a number of springy spots were attended to and drained into already existing systems.

Fencing.—Nearly 9,000 feet of wire fencing was put up, with posts fifteen feet apart and three feet in the ground. A good deal of this wire was used to replace the old, and it was unfortunately observed that the life of metal fencing is rather short.

Roadmaking.—A great deal was done at this in grading, filling, levelling, ditching, besides the concrete work necessary for retaining walls and culverts. Very soon, there will be drives all around the orchards, trial plots, paddocks, pastures, and experimental plots.

CEREALS.

The work with cereals includes test of varieties, the isolation of good strains, the growing of grain for hay, comparison of different mixtures for grain and the production of seed for sale.

Variety tests.—Nine varieties of spring wheat were tried; of all which have been on test for six years or more, Huron stands at the head with an average of 1,392 pounds per acre, and it took 101 days to come to maturity. Seven varieties of oats were tried; of all which have been on test for six years or more, Banner is at the top with an average of 2,327 pounds per acre, and it took 99 days to come to maturity. Eight varieties of two- and six-row barley were tried; of all which have been on test for six years or more, Manchurian seems to be best adapted to central Quebec. Five varieties

of field peas were tried; of all which have been on test for six years or more, Arthur is the heaviest yielder with an average of 1,976 pounds per acre, and it took 97 days to come to maturity.

Isolation of good strains.—After five years of selection for Manchurian barley and Arthur peas, and six years for Huron wheat, the highest yielding strain of each was multiplied, and will be sown in the trial plots in 1918. The best strain of Manchurian was 16 per cent better than the checks, that of Arthur peas 18 per cent, and that of Huron wheat 8 per cent.

Growing of grain for hay.—The average of three years shows that when mixed hay from old meadows produced 3,655 pounds per acre, timothy 4,134, and clover 4,078, hay from Banner oats gave 5,380, from Ligowo oats 5,820, from Gold Rain oats 7,160, from Victory oats 7,200, from Banner oats and vetches 5,660, from Banner oats and Arthur peas 5,447 pounds. Oats alone, especially of varieties such as Victory and Gold Rain, yield the largest quantity of dry matter per acre, whilst the old mixture of peas and oats furnishes the most protein or the best hay to feed to dairy cattle, sheep and all young stock.

Mixtures for grain production.—Up to the present, the mixtures have not yielded more per acre than if the different grains had been sown alone. But this work will be continued with oats and barley, both for an early and a late crop; oats and wheat, also for an early and a late crop; and with oats, barley and wheat, the latter mixture being intended for poultry feed.

What influences cooking qualities of peas.—Arthur peas were sown in six different places to find if the soil or the preceding crop had any effect on their cooking qualities. It took two hours to cook them when they were sown on light land after a stubble, and the same time on heavy land after a stubble; 2½ hours on light land after a hoed crop; 3½ hours on heavy land after a hoed crop; 3½ hours on heavy land after grass; and 4½ hours on light land after grass. The soil did not seem to have much effect, but it is interesting to note that, on an average, it took 2 hours to cook peas grown after a stubble, 3 after a hoed crop, and 4 after grass. This experiment will be continued.

Production of seed for sale.—Banner oats, Huron wheat, Manchurian barley and Arthur peas are grown each year for seed production. The grain is of extra good quality or is not sold at all, and is shipped in sealed bags, so that no mixing or pilfering can take place during transit. Prices vary, according to the value of feed grain, and can be had on application. There was never yet nearly enough produced to satisfy all applicants, though hundreds of bushels are sold each year, and persons desiring to commence with first-class stock should give their orders early.

FORAGE CROPS.

Investigations with forage crops consist in the testing of varieties, the selection of good strains, seed growing and a comparison of different methods of helping the germination of mangel seed.

Variety tests.—Up to date, Longfellow has given the most satisfaction for corn, though other varieties give larger tonnage and may yet supersede it if they can come near enough maturity to make good silage. Of all varieties of swedes tried for seven years, Good Luck was the highest yielder with an average of 39,812 pounds per acre, whilst for carrots it was Mammoth White Intermediate with 16,231 pounds, and for mangels it was Giant Yellow Intermediate with 14,618 pounds.

Selection of best strains.—Work of this description was continued with Quebec Yellow corn. Seed was in great demand and was sent to distant points including Alberta and England.

Seed Growing.—Good Luck swedes and Quebec Yellow corn were grown for seed distribution and samples sent to applicants.

Helping the germination of mangel seed.—Fertilizer, also salt, mixed with the soil or sown in the row, soaking seed for twelve hours in water and in water with liquid manure, watering and packing soil were all tried, each six different times, with the result that the checks were practically as good as any method. Salt was injurious to the seed in all cases, also fertilizer, but the latter only when sown in the row.

FLAX.

An acre of flax was grown for fibre, and there seems no doubt that this crop should be grown only on very clean land, as it is extremely costly to pull the plants, which should not be cut, when weeds are numerous.

TOBACCO.

Five varieties of tobacco have been tried at Cap Rouge for a few years: Petit Havane, Canelle, Comstock, Belge, Connecticut. According to the Chief of the Tobacco Division, at Ottawa, only the first mentioned is early enough to succeed in this locality. Moreover, the tobacco manufacturers of Quebec do not care to use tobacco produced in this district.

FERTILIZERS.

There are now six projects under investigation, and 5 acres are devoted to this work: comparative values of different forms of nitrogen and phosphoric acid, manure versus clover as a source of humus, comparative value of different elements as supplements to farm manure, burnt lime versus ground limestone, value of ground seaweed as a fertilizer, comparison of different formulæ. Generally, a three-year rotation of hoed crop, grain, and clover is used so that the effects can be noted not only the year of the application of the fertilizer but also on the two subsequent crops. Nothing definite has been arrived at yet, and it may be said that this question of chemical fertilizers is a great deal more complex than most people believe.

HORTICULTURE.

The investigations in this division relate to fruits, vegetables, and ornamental plants.

FRUITS.

Variety Tests.—The fruits grown at Cap Rouge are apples, cherries, pears, plums, grapes, black, red and white currants, gooseberries, raspberries, and strawberries. There are 321 varieties under test and, especially for small fruits, it is already possible to tell which will do best in the district.

Cultural Work.—Different cover crops such as rape, clover, vetches, hay removed, hay left as a mulch, are tried, and the diameter of the trees having been taken for each lot at the start, the effect will be noted not only on the yield of fruit but on the growth of the trees.

Cost of establishing an orchard.—The object of this experiment is to find out how much it costs to establish an orchard of McIntosh apples. There are over four hundred trees, and Wealthys have been put in as fillers so as to get a few crops from them before the McIntoshes come into full bearing, when these will stand 35 feet apart in all directions. All expenses for materials, horse and manual labour are recorded.

VEGETABLES.

Variety Tests.—Over 200 varieties are tested each year for yield, earliness, and quality.

Cultural Experiments.—There are some with beans, beets, cabbage, carrots, cauliflower, celery, onions, parsnips, peas, potatoes, rhubarb, tomatoes. They relate to thinning distances for roots, protection against maggots for cabbage and cauliflower, methods of blanching for celery, methods of forcing for rhubarb, comparing sets with plants and open ground seeding for onions, methods of training and staking for tomatoes, number of eyes, also plastering, for potatoes, comparing varieties of different degrees of earliness with one sown at different times for beans and peas.

ORNAMENTAL PLANTS.

Over one thousand varieties of trees, bushes, and plants are grown, and notes taken for each regarding foliage, flowers, size, growth, etc.

EXTENSION AND PUBLICITY.

The work for this Division consists in having exhibits at fairs and distributing literature.

EXHIBITIONS.

Products from the Station were sent to four exhibitions: Three Rivers, Quebec Provincial, Lotbinière County, Quebec Seed Fair. The space covered by exhibits formed a total area of 2,900 square feet. About 112,000 persons visited these fairs, and it was estimated that some 23,000 saw the installation from Cap Rouge. Two diplomas and a special prize were awarded to the Station exhibits.

PUBLICITY.

At the above fairs a great quantity of bulletins was distributed, and names were entered on the mailing lists. Besides, a large number of publications are sent on request and to the persons who receive seeds, plants, or trees, giving special information about growing what they get.

MISCELLANEOUS.

Distributions.—The following were distributed to farmers, members of survey work, and to the Illustration Stations: 1,480 eggs and 14 cockerels (Barred Rocks), 1,632 pounds Banner oats, 1,044 apple trees, 12 gooseberry bushes, 111 currant bushes, 324 raspberry canes, 4,000 strawberry plants, 624 perennial flowering plants, 300 roots of Good Luck swedes, 108 packages tomato seed, 612 packages flower seeds, 60 packages cabbage seed, 53 packages sweet corn, 47 packages garden peas, 38 packages garden beans, 9 packages field corn, 30 packages swede seed, 63 packages field beans.

Visitors.—Including the excursions at the Station, there were during the year 3,349 visitors, besides the large number of people who come, in the summer, on Sundays, when it is not unusual to see 100 during an afternoon.

Buildings.—A modern calf barn was started, and will be completed in 1918. Besides this, only urgently necessary repairs were made.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

REPORT OF THE SUPERINTENDENT, J. A. McCLARY.

THE SEASON.

The severe cold weather throughout the winter of 1916-17 broke on the 24th of March, and the snow disappeared very rapidly, so that the first ploughing was done at the Station on the 18th of April and the first seeding on the 30th of the month.

The month of May was very cold, which retarded vegetation, but the ground being fairly dry and the weather cool, farmers were able to do their seeding under good conditions.

The excessive amount of rain in this district throughout the summer months made it very difficult for the farmers to harvest their hay and grain crops, and it was very detrimental to the potato crop, causing the potatoes to blight and rot badly in certain sections.

The weather during September was generally fair, enabling the farmers to finish harvesting their grain as well as most of their corn crop. There was a hard frost the night of the 22nd of September, which killed all tender plants.

There was not the usual amount of ploughing done in this district in the fall on account of the scarcity of labour, wet weather, and early frost, which prevented ploughing being done after the 10th of November. Snow fell on the 18th of November, and there was good sleighing on the 23rd of the month.

The winter of 1917-18 has been one of the severest ever experienced here. The cold weather throughout the winter seemed to break on the 17th of March, and there have been fine warm days the last of the month which have caused the snow to disappear gradually.

METEOROLOGICAL RECORDS.

Month.	Temperatures.					Precipitation.			Total Sunshine.
	Maximum.		Minimum.		Mean.	Rainfall.	Snowfall.	Total.	
1917.	Date.	Degree.	Date.	Degree.	Degree.	Ins.	Ins.	Ins.	Hours.
April	21	63	11	13	37·96	1·24	.....	1·24	106·7
May	31	77	22	26	45·38	2·25	.....	2·25	136·0
June	13	84	7	40	60·21	7·38	.....	7·38	174·3
July	23	90	7	40	67·61	3·97	.....	3·97	216·1
August	1	92	27	45	65·12	8·27	.....	8·27	204·8
September	27	79	23	24	52·78	1·78	.....	1·78	188·1
October	19	67	23	23	42·19	5·43	.....	5·43	81·1
November	18	49	27	−13	25·12	0·18	0·87	1·05	95·6
December	21	40	30	−45	5·74	.....	2·55	2·55	68·1
1918.									
January	12	37	28	−45	2·16	.....	2·20	2·20	70·7
February	20	49	2	−33	9·75	0·57	1·20	1·77	75·6
March	31	57	11	−25	22·72	.....	1·60	1·60	153·7
Total	.....	.....	.....	.....	.....	31·07	8·42	39·49	1570·8

LIVE STOCK.

Horses.—This Station now has nineteen horses, five registered Clydesdale mares, twelve well-graded work horses, one driver and one registered Clydesdale foal.

Three of these mares were wintered in a yard with a box stall to run into. They were fed on a ration of 20 pounds of hay, 30 pounds corn silage, and 2 pounds bran each per day. These horses wintered well, considering the economical ration which they had.

Cattle.—The Ayrshire herd which is installed in the new dairy barn consists at present of 13 cows, one 2-year-old bull, two 2-year-old heifers, seven yearling heifers, and nine calves.

This herd is headed by the 2-year-old bull Gardrum Bold Boy—47138—purchased from the Nova Scotia Agricultural College, from one of the highest milk producing cows in their herd. The breeding of this bull is considered to be of the best in regard to milk production, conformation, and size, his dam making over 16,000 pounds in her last lactation period.

Beef Steers.—There were wintered at this Station ninety-one steers in order to consume the silage and hay raised on the farm, and at the same time to ascertain the profit in steer feeding. These cattle will be sold the first of May.

Sheep.—There are at present at this Station ten registered Oxford ewes, five registered Oxford lambs, one registered Oxford ram, also thirty-two grade Oxford ewes and twenty-five grade Oxford lambs.

The clip of wool was sold in the spring of 1917 through the Sherbrooke County Sheep Breeders' Association, after being graded at Lennoxville, for 56¼ cents per pound. There were also sold, through this organization, in the fall, seventeen lambs at 14⅗ cents per pound and ten aged ewes for 9⅗ cents per pound.

FIELD HUSBANDRY.

Rotations.—The only rotation work this Station has so far under operation is the general four-year rotation, that is the ploughing of sod and planting of corn and roots, followed with grain seeded with 9 pounds of red clover, 2 pounds of alfalfa, and 10 pounds of timothy per acre, followed with clover hay, two crops being taken off. Part of the second crop, when the season is favourable, is used for seed purposes, and the balance put into silos for ensilage. This use of the silo has given very good results the past two years, permitting the saving of this valuable crop if the weather is not favourable for drying, and making with it one of the most nutritious foods that can be had for dairy cattle, beef, sheep, and swine.

Crop Yields.—The hay crop was an average one, this Station having 260 tons. Sixty-five acres of oats were sown. Thirty acres of this being on a very rough piece of land which was underdrained the fall before and broken, only yielded 20 bushels per acre. Thirty-five acres which was on corn stubble had an excellent growth until it was struck with a heavy storm before ripening, causing it to lodge very badly. The yield on this area was 32 bushels per acre.

Forty acres were planted to Indian corn for silage purposes. The season being very wet, the yield was only 12 tons per acre, but the four large silos at this Station were filled by adding 30 tons of clover.

FORAGE CROPS.

Roots.—Fourteen varieties of swedes were tested, the Invicta giving the highest yield of 20 tons 150 pounds per acre, the lowest being Kangaroo, 12 tons 125 pounds.

Four varieties of fall turnips were tried, the Cow Horn being the largest yielder, 14 tons 1,350 pounds per acre and the Yellow Aberdeen Purple Top the lowest with 8 tons 1,300 pounds.

Nine varieties of mangels were under test, the Giant Yellow Intermediate giving the highest yield of 16 tons 450 pounds, and Prize Mammoth Long Red the lowest with 11½ tons.

Three varieties of sugar beets were planted, the Russian sugar beet giving 8 tons 500 pounds per acre, the lowest being Klein Wanzleben yielding 5 tons 1,750 pounds.

Five varieties of carrots were also under test, the White Belgian giving 14 tons 1,315 pounds per acre and Giant White Vosges 10 tons 900 pounds.

Rape.—Three varieties of rape were tested in rows 30 inches apart, the Dwarf Essex yielding 12 tons 1,250 pounds and Thousand Headed Kale 10 tons 1,200 pounds per acre.

Indian Corn.—Eleven varieties of Indian corn were tested. In the dent varieties, Essex Dent yielded 15 tons 1,315 pounds, the Howie being the lowest with 12 tons 1,071 pounds. In the flint varieties the Early Longfellow topped the list with 18 tons 396 pounds per acre and Quebec Yellow was the lowest yielder with 11 tons 1,038 pounds. With the excessive amount of rain which fell throughout the growing season, all varieties of corn and roots did not develop, yield, and mature as they would have in an average season.

Alfalfa.—This Station has not been able to accomplish much with alfalfa yet. What has been sown in plots broadcast is very delicate, and much of it does not seem to survive the winters. What has been planted in drills 24 inches apart has done far better and gave a very fair growth the past season, which demonstrates very conclusively the importance of cultivation with this forage crop. About two pounds of alfalfa seed per acre is always used in connection with clover and timothy in seeding down for the field crop of hay, with the object of endeavouring to inoculate the soil in a small way for the growing of this crop.

HORTICULTURE.

The past season was decidedly a poor one for horticultural work. The late spring and cold, wet, backward summer greatly hampered progress. In many places great difficulty was experienced in tillage operations in the early part of the season and, as the season advanced, conditions were very little improved because of the impossibility of keeping up cultivation in consequence of the torrential rains which occurred with such frequency. The season was cut short by the occurrence of a very severe frost September 22, when all tender stuff was killed.

That serious damage resulted from the ravages of fungous diseases need only be supported by the fact that the potato crop was only about 50 per cent of the average crop of former years. The blight affected the potato tops in the latter part of August, and in a very short time the whole of the crops of the countryside were killed. The killing of the tops was followed by the rotting of the tubers, which very greatly cut down the already comparatively small yield.

So far as can be ascertained, the majority of the farmers are determined to spray their potato crops with Bordeaux mixture as a control for late blight. This movement has arisen from results obtained on experimental plots which were established and conducted at various places throughout the district.

In the raspberry plantation the amount of cane blight was considerably less than during the previous season.

Tree Fruits.—The possibility of developing orchards in this part of the Eastern Townships has been the subject of much discussion. However, the success of the venture has of late been very gratifying. The twenty-four and a half acres of orchard which are comprised of the best commercial varieties of apples, suitable for Quebec conditions, seedlings from the Central Experimental Farm, and plums, cherres, and pears from the various nurseries, have up to the present made most satisfactory growth and are in excellent condition.

Bush and Cane Fruits.—Very gratifying results were obtained from the bush fruits in 1917. They all yielded well considering that the plantation was started the spring of 1915.

Black Currants.—Twelve varieties. Of these the following three seemed to give most decidedly the best results as to yield, size and quality of fruit: Saunders, Climax and Buddenburg.

Red Currants.—Twelve varieties. The following three seemed the most outstanding as to yield, quality and size of fruit: Red Grape, Lee's Prolific and Victoria Red.

White Currants.—Three varieties. They are given in order of merit: White Cherry, White Grape, Large White.

Gooseberries.—Ten varieties. The yields from these bushes were small.

Red Raspberries.—Six varieties. King, Herbert, and Brighton gave the best results.

Propagation.—A considerable number of cuttings from the different varieties of currants and gooseberries were planted. They made satisfactory growth during the season, developing into quite good plants. They are to be used in connection with the distribution work.

Strawberries.—Thirty varieties of strawberries have been under test. The results obtained from the common varieties have been very satisfactory. However, the everbearing sorts have not proved to be a very great success.

Vegetables.—The variety and cultural tests conducted with the various varieties of vegetables furnished some very interesting results, thereby serving as an excellent demonstration to the many visitors that came to the Station.

Tests were conducted with the following vegetables: Cabbage, cauliflower, brussels sprouts, onions, beets, peppers, egg plant, leeks, carrots, parsnips, turnips, salsify, radishes, lettuce, celery, squash, pumpkin, corn, melons, citron, tomatoes, potatoes, peas and beans.

Vegetable Seed Growing.—A considerable quantity of vegetable seeds was grown during the past season, including the following: Cabbage, parsnip, beets, onion, radish and tomato, also beans, peas, and corn. These seeds were distributed to those applying to this Station.

Ornamentals.—The shrubs and perennial borders planted the fall of 1916 along the south and west sides of the main lawn wintered well.

The shrub border, which is along the west side of the lawn, did very well during the summer, but the perennial border, which is at the south side of the lawn, was rather a disappointment in some respects. The land is of a heavy texture, being very wet and cold, consequently many of the flowers died during the early part of the summer. These were replaced and hopes are being entertained for their success another year.

Bulbs.—The tulip beds proved the source of much favourable comment, and were a great attraction in the early part of the season.

Annual Flowers.—In the annual flower garden there was great profusion of bloom from the early part of July until the frost came, September 22.

All varieties did extremely well, excepting the asters. The sweet peas blossomed very freely. It was noted that peas that were sown April 17 were more vigorous and flowered more freely than those sown May 8 and 13 respectively. Peas started in the hotbeds, although satisfactory, did not compare with those sown out-of-doors at an early date.

Perennials.—A large number of varieties of perennials were grown in nurseries. They serve a double purpose. First as a base of supply for the borders and to secure continuity of bloom, and (2) to obtain seed for the distribution work. These perennials were a great centre of attraction for the great volume of visitors that came to the Station during the summer. That perennial flowers are becoming popularized in these districts is evidenced by the fact that there is a growing demand for the seed grown and distributed from this Station each year.

Seed Distribution.—There had been a very great demand for all varieties of seeds grown. Three hundred collection packages of seeds were sent out, the collection consisting of garden peas, sweet corn, tomatoes, five varieties of perennial and two varieties of annual flower seeds. Applications have also been accepted for 700 samples of potatoes, which will be distributed in the month of April, of the Green Mountain, Irish Cobbler, and Rose of the North varieties.

A distribution is also being made of 100 packages of strawberry plants, of 25 plants each, and 100 packages of small bush-fruit cuttings which will go forward in the month of April.

FARM IMPROVEMENTS.

There was an artesian well drilled in the months of July and August, 385 feet deep, with a capacity of 2,000 gallons of water per hour for the supply of the water system at this Station.

Buildings.—In September there was started the erection of a new dairy building located over the artesian well, which is situated very near the new dairy barn. The size of this building is 40 feet by 26 feet. The basement, which is of concrete, 8 feet high, will accommodate the two large pneumatic tanks for the water system, the dimensions of which are 5 feet by 20 feet, and also the electric motor and deep-well pump for said system. The upper part of this building will be used as a small dairy, with operating room for churn, separator, and butter workers, wash-room, boiler-room, and a small cold storage plant.

There was also erected at the new dairy barn this season the second silo, 18 feet by 30 feet.

There is under erection and not yet completed for the poultry branch at this Station, one hen house 16 feet by 32 feet for the accommodation of one hundred hens, and a poultry administration building 22 feet by 26 feet, the concrete basement to be used for incubator room and egg room, etc. The upper story will be used as an office, bed-room for attendant, and storage for feed. These buildings are located on the flat near the public road being the nearest farm buildings to the town of Lennoxville.

Fencing.—Two hundred rods of 48-inch high No. 9 galvanized wire fencing was erected on farm roads and around the new school grounds on the northeast corner of the farm.

Clearing land.—The rough pasture land which was drained in 1916 and ploughed for the first time in the fall was worked and got into as good shape as possible. This swamp promises to be one of the most fertile parts of the farm.

Roads.—There was started by this Station in the month of October, the building of a farm road on the east side of the farm extending from the northeast to the southeast corner. A considerable amount of work was done in grading, culverts were put in place and, through the winter, gravel was drawn and piled to be used for said road.

This road is not only built for the Farm, but for the accommodation of the rural district which is located south of it, to enable the children to attend the new Consoli-

dated Model School of the township of Ascot which is being built on the northeast corner of the farm. This school is being erected by the Ascot township at a cost of $24,000, and it is bound to be a great asset to the rural district.

Outside of this, there was considerable gravelling on other farm roads, as gravel and the King log drag seem to be indispensable in the up-keep of country roads.

MEETINGS.

On the 22nd of August there was held the third annual summer Farmers' Day at this Station, which was attended by over 1,500 people from all parts of the Eastern Townships. There seems to be a large increase in the attendance and interest shown in these gatherings since the Farm was established.

The staff at the Farm has attended throughout the year a number of meetings in different parts of the district in connection with Farmer' Clubs and Agricultural Societies and other meetings organized by the Lennoxville Station. The meetings have been well attended and much interest and good-will shown.

VISITORS.

A very marked increase is noticed in the number of visitors, especially through the summer quite a number of small gatherings of a few farmers from different neighbourhoods coming by auto, and spending a few hours looking over the work of this Station.

Through the winter months there seemed to be a great interest taken in the livestock work, especially the recently installed Ayrshire herd and new dairy barn; also in the sheep, beef cattle and horses.

EXPERIMENTAL STATION, SPIRIT LAKE, QUE.

REPORT OF THE FOREMAN-MANAGER, PASCAL FORTIER.

THE SEASON.

The season of 1917 was one of the most unfavourable for crop production since the opening up of the district.

The winter of 1916-17 was exceptionally cold, with but little snow until March and April. The severe winter was followed by a long, late spring. There was still snow on the ground, and the lakes were still frozen over, during the first half of May.

The heavy rainfall during the latter part of May and through June hindered seeding until the 11th of the latter month. Operations were continued during the rest of the month although, the land being sometimes spongy in character, it was not as well prepared as was desired. It was hoped that the weather would be more favourable in July and August, but rains or cloudy weather continued five days out of seven, until November.

However, there was a fair prospect of a crop on those areas not flooded out but on the night of August 19-20 a heavy frost cut down potatoes and all garden crops. The first snow fell on September 8, and there were heavy frosts almost every night

that month; the cold and snow prevented from ripening most of the grain which had survived the rains, and part of the grain crop had to be left in the field, although cut.

The winter of 1917-18 has been normal, snow fell in abundance from November on, and the cold has been steady up to the end of March.

LIVE STOCK.

Horses.—There are 20 horses on the Station, made up of 18 heavy draught and two drivers. The above number includes five mares, one Percheron and four Clydes.

The cost of feed for the horses during the year was 40 cents per horse per day. This is higher than usual owing to the necessity of buying practically all feed used.

Cattle.—Three milch cows are now at the Station, two Holsteins and one Ayrshire.

Swine.—Three Yorkshire sows and one Yorkshire boar were sent here from the Central Farm in October last.

Poultry.—The flock numbered 29 at the close of the year, the breeds kept being Wyandotte and Plymouth Rock.

FIELD CROPS.

One hundred and fifty-two acres were sown in the spring of 1917, of which 125 acres were in oats. The yield was 125 bushels of grain and 25 tons straw; the rest was either drowned out before maturity or left in the field owing to continued wet weather at harvest time. One hundred acres of the oat land were seeded down to timothy, red clover, and alsike. These grew well, and promise a good hay crop in 1918.

Twenty tons of hay were harvested. Its quality, however, was poor, owing to the wet weather.

Wheat, barley, flax, and hemp did not succeed well owing to the wet season. The wheat (Marquis) reached a height of from 3½ to 4 feet, and the heads were well filled at harvest time but on account of wet and frost it was not harvested.

One half-acre of potatoes was planted on June 20.

CLEARING.

During the year 25 acres were got ready to burn over, and 40 acres ready to plough. Forty acres more require about two weeks' work to be ready for seeding.

HORTICULTURE.

The apple trees in the nursery grew well, as did the seedlings, but about 15 per cent of the former and 35 per cent of the latter were winter-killed. Forty-two seedlings were planted in their permanent location in the fall, as well as a further lot of apple trees and of raspberry bushes received from the Central Farm.

In vegetables the following were tried: Tomatoes, cabbage, cauliflower, celery, parsley, onions, leeks, lettuce, beans, beets, Brussels sprouts, carrots, corn, parsnips, peas, squash, turnips, citrons, melons, cucumbers. Although not sown in the hot-beds until May, all grew well until destroyed by the frost of August 20.

In a normal season there is every reason to believe that vegetables will do well in this district.

Flowers.—In spite of a late spring and early frost, flowers generally did well, most annuals remaining in bloom up to October 10. Sixteen varieties of poppy received from Ottawa were planted in the nursery for the time being.

Ornamental Trees.—From the Central Farm, 396 trees were received and planted in the nursery in October, as well as a large shipment received from the Chief Forester

of the province of Quebec, and comprising white elm, white plane trees, sugar maples, white ash, red oak, and European larches.

During the winter hundreds of loads of moss, which had been collected by the prisoners of war before the internment camp was closed, were hauled on to the parade ground, which it is planned to convert into a lawn, with flower beds, ornamental trees and shrubs, etc.

FARM IMPROVEMENTS.

A stone basement, with cement floor, was put under the barn, and some necessary improvements and repairs made to the houses on the Station.

A total of 5,250 feet of drains was dug. These drains are 5 feet wide and 6 feet deep.

EXPERIMENTAL STATION, KAPUSKASING, ONT.

REPORT OF THE FOREMAN-MANAGER, SMITH BALLANTYNE.

THE SEASON.

Conditions during the season were very unfavourable throughout the district, it being one of the most backward seasons recorded for years in northern Ontario. The snow did not disappear until towards the middle of April, and during the remainder of that month and May there was a continual rainfall, which prevented early cultivation of the land.

Seeding could not be commenced at the Station until the 29th of May, and it was as late as June 15 before it was completed. Owing to the excessive precipitation and the cold weather, the crops failed to mature rapidly, and as early as August 29 there was a heavy frost that destroyed all the vegetables, and on September 6 a killing frost that destroyed all the grain and cereals, which were only in the milk stage at that late date.

LIVE STOCK.

Horses.—There are fifteen draught horses at the Station which are employed constantly, clearing the land, grading roads, and hauling firewood, besides doing the general farm work, while during the past winter they have been hauling pulpwood and the timber used at the mill during its operation at this Station.

Dairy Cattle.—The herd comprises sixteen head, thirteen of which are grade Ayrshire and three grade Holstein. There are also four yearling Holsteins and seven heifer calves. One thoroughbred registered Holstein bull heads the herd.

Beef Cattle.—Twenty-eight steers of a first-class beef type were purchased at Winnipeg in December, costing 9⅔ cents per pound. They were carried along with roughage for two months and now are being finished off with clover, timothy, and gluten meal, showing remarkable gains, and when sold a reasonable margin of profit is hoped for.

Swine.—There is one registered Yorkshire boar and one sow at the Station, but as yet there is no young stock, so that no experimental work in feeding or pork production has been carried on.

FIELD HUSBANDRY.

No crop rotations have as yet been established, owing to the necessity of preliminary work in clearing the land.

Owing to the heavy frosts that killed all the crops no grain matured so that it could be used for seed.

Over one hundred and ten acres of land was sown with oats; only about six acres of this matured. Five acres were sown with O. A. C. barley and gave every indication of a heavy crop; small patches ripened on the well-drained areas. A large area of Marquis wheat, which should have been a fair crop, was destroyed in the milk stage.

The heaviest crop at the Station was a mixture of Arthur peas and oats. This was cut green and fed to the stock.

FIELD HUSBANDRY.

There were two plots of 8 acres each sown in fall wheat and rye, this grain was sown on August 29 and 30, 1917, and made remarkable growth until the winter set in, when it was well protected by a heavy fall of snow.

This crop came through the winter in good condition, and indications promise a good crop of both.

FORAGE CROPS.

Six 8-acre plots were sown in grass on land that had just been cleared of standing timber and that had not been stumped or burned over. The plots were sown with varied mixtures of timothy, blue grass, red and white clover, meadow fescue, western rye, Kentucky blue grass, orchard grass, and alfalfa. The catch on the different plots was a very good one. The total area will be used as pasturage the coming season for cattle. Six plots of two-thirds of an acre each were sown in red clover, timothy, and alsike, with and without nurse crop and in drills 30 inches apart. All plots did extremely well, and it was hard to determine which of the plots proved most satisfactory, as an experiment, but the coming season will prove which method of seeding is the most adaptable to this country.

The root crop this season was a failure owing to the extremely wet spring and the very late date at which seed was sown; hence no tests as to the relative merits of varieties could be made.

HORTICULTURE.

Tree Fruits.—There are now 168 seedlings in the nursery, all of which made a remarkable growth during the past season, and are ready for setting out in permanent rows, this season.

The currants and small fruits, although few in number, gave an average yield, while the Herbert raspberry did extremely well. The small fruit field last year, in spite of the unfavourable weather conditions, did well, demonstrating the fact that this climate, owing to the rapid growth during the short summer season, will be very suitable to the production of small fruits.

Vegetables.—Variety tests were carried on with beans, lettuce, onions, celery, corn, cucumbers, parsnips, cauliflower, and cabbage. The tender vegetables suffered from the frost, but the hardier varieties, with few exceptions, did well.

Two and one-half acres of well-cultivated land were planted in potatoes with untested seed of unknown variety. The total yield from the plot was 150 bushels. The failure of the crop was characteristic of the district being caused by poor seed, weather conditions, and early frosts.

Ornamental Gardening.—A few varieties of annual and perennial flowers and bulbs were planted during the season, and did very well, but no variety tests were carried on or seeds saved, but during the coming season, when the grounds are laid out, it is planned to investigate the varieties of flowers suitable to this district.

A number of flowering shrubs and ornamental trees, which arrived at the Station late last fall, were trenched for the winter, and will be laid out in attractive design on the new lawn which will be made around the foreman-manager's house this coming season.

FARM IMPROVEMENTS.

Buildings.—The new dairy barn, with accommodation for forty head of cattle, was completed; this barn is equipped with forty stanchions of the Beatty type. In addition to the above there were constructed in the horse barn, seven pens for calves and bull.

A new 2¼-ton Fairbanks scale with a 37-inch by 47-inch platform was installed in the feed room.

The foreman-manager's house was erected and completed, being ready for occupancy in March.

A temporary implement shed was erected for the protection of farm implements and machinery.

Clearing Land.—One hundred acres of land were cleared and ploughed for the spring crop of 1918.

Another block of 128 acres were cleared of standing timber, from which was taken 1,500 cords of pulpwood and 200 cords of fire-wood.

During the past winter, bush activities kept the teams busy, hauling logs to, and lumber from, the mill, where 150,000 feet of lumber was sawn to be used for building purposes on the Station.

Drainage.—During last season over 1,100 feet of drain were laid. This work was done as economically as possible, employing plough and scraper for back-filling wherever possible.

It is hoped to demonstrate the value of drainage, especially to virgin soil, this spring, by being able to sow the crops much earlier, which is of vast importance in this district, with its short season; this should prove of great value in greater production.

Fibre.—Two plots of 1/10 of an acre each were sown in hemp and flax; the hemp showed a remarkable growth, attaining a height of 4 feet 6 inches, but 6° of frost on September 6, destroyed both.

EXPERIMENTAL STATION, MORDEN, MAN.

REPORT OF THE ACTING SUPERINTENDENT, E. M. STRAIGHT.

THE SEASON.

The seasons vary much in southern Manitoba. Not much can be gathered from one's former experiences, for the unexpected usually happens. The ground was ready for work early enough, but killing late frosts were common, causing the re-seeding of some crops and the absolute destruction of others. Frosts were early in the autumn also so that the season, shortened from both ends, was unable to mature many of the vegetables. The flowers also made a poor showing, owing to a combination of cut-worms, dry weather, and frost. For the cereal crops, however, the weather was fairly favourable, and normal yields of these were harvested, despite the drought in August. The snowfall was very light. The ground was bare for much of the time, and partly so throughout the winter. Temperatures as low as forty below zero were registered, when there was not snow enough to afford any protection. After the first of March the thermometer was below zero for only two days, and above sixty for two days during the same month.

LIVE STOCK.

Horses.—Twelve horses are kept at the Station. The work horses are grade Clydesdales for the most part, and for the entire season were kept in excellent condition.

Cattle.—Thirty steers of fair quality were purchased in 1916 and divided into two lots for a feeding trial to compare the finishing of steers in a barn with those finished in a single-board shed and corral protected by a board fence. The weather in January and February was very severe, and the steers in the open shed at that time seemed to make very slight gains. However, they gained rapidly in early spring, and finished well. Both lots were outstanding on the Winnipeg market at time of sale.

The first cost of steers was $6.50 per hundred, and the selling price was $11.50 per hundred, the profit over feed of the lot fed in the barn was $589.81, and of the lot fed in the shed $541.77, a difference of $48.04; but the difference in interest on investment in buildings in favour of the open shed was $53. Hence, if the extra profit from the inside lot was more than counter-balanced by the difference in interest on money invested, then the extra depreciation and insurance on the expensive building would be largely loss.

Sheep.—The experiment to determine the value of rusted wheat sheaves in place of hay for pregnant ewes was completed. These sheaves produced no ill effect; all ewes remained in good condition and gained slightly in weight, and the lot on rusted wheat sheaves led the rest. The present flock consists of seventy-five breeding ewes and twenty lambs. Fourteen experimental feeders were maintained on the farm until March 26, when they were sold at 11 months of age at an average price $19.31 each.

FIELD HUSBANDRY.

Owing to the fact that the work of the Station had been carried on for so short a time, no definite rotation of crops could be adopted. The chief work has been to rid the farm of weeds by means of the summer-fallow, and at the same time to produce such crops as were possible. Thirty acres were seeded to Marquis wheat during the last week of April. The germination was excellent, and 539 bushels of wheat were harvested. The straw was short, owing to continued drought in mid-season, as above reported. This wheat will be used as seed for a 60-acre block in 1918. Some effort was made to prepare this wheat for seed distribution also, but, because of wild oats which were present in some quantity, it was found that the amount of work necessary to separate these thoroughly from the wheat would not pay.

Forty-eight acres of oats were threshed. These yielded 1,081 bushels. In addition to this, 35 acres of oats were cut for hay.

About 24 acres of barley were sown, and 630 bushels harvested. No large area was in hay. About 20 acres of Western rye grass and red clover was cut once, and about 9 acres of alfalfa cut twice. From this area about 70 tons of prime hay were harvested.

Some 14 acres were planted to field corn. The germination was not very good, so that the yield was light. As there is yet no silo on the farm it has not been thought well to extend the corn area, as the present amount seems to be about all that can be fed to advantage.

HORTICULTURE.

Having in mind the development of hardy strains of apples, small fruits, and vegetables for prairie conditions, considerable attention has been given to horticulture at this Station. The area given to this branch of the farm work, consists of about 90 acres, and is being rapidly utilized. A new orchard of about 10 acres was set out in the spring of 1917, consisting of forty-five new varieties of apples, six of plums, and a number of hardy pears from Professor Hansen. These were protected so far as possible by means of hedges of the *Caragana arborescens,* laurel-leaved willow, and sunflowers. Clean cultivation was followed in the orchard until the middle of July, when rape was sown. A few bush fruits were also set out, but made a poor showing.

Vegetables.—The season for vegetables in this section was not favourable. All of the more hardy types were grown to some extent, but the showing was not so good as in 1916, with the exception of potatoes. These yielded fairly well, and the Early Ohio, one of the leading sorts here, as well as others, were of good quality.

Ornamental Gardening.—Considerable quantities of perennials were sown in the nursery, in anticipation of future needs. No permanent planting of these has been thought advisable until the Station buildings are erected and driveways definitely decided upon.

POULTRY.

No poultry has been kept at the Station so far, but it is a line of work which it is hoped to develop in the near future.

BEES.

Two colonies of bees were obtained in the spring, and made normal development during the summer. About 65 pounds of honey were sold. Two colonies went into winter quarters weighing approximately 65 and 77 pounds. As there was no good location for cellar wintering on the Farm, they were placed in a wintering case in a sheltered position out-of-doors. During some of the mild days in March of 1918, the bees obtained a flight and promised well for the season.

FARM IMPROVEMENTS.

Buildings.—A granary was completed during the summer, and proved to be a serviceable building. The barn roof was shingled, and other minor repairs made on the same building. A root cellar in connection with the horticultural work was completed, and a large quantity of potatoes stored. During the trying weather of January, it seemed impossible to keep the frost out of this cellar, so that much damage was done to the vegetables therein. The sheep shed which was in the course of construction during the summer was much delayed because of bad weather, but at the end of March it is nearing completion.

Fencing.—The fencing on the farm is now almost complete. Eight-foot cedar posts and No. 9 Page woven-wire fencing have been used. Two strands of barb wire have been used above the woven wire. This arrangement has given a very excellent and satisfactory fence.

MACHINERY.

Not much new machinery has been purchased. For the work being done, the present equipment has been found fairly satisfactory.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

The season of 1917 was a most unfavourable one for crop growing in Manitoba. The spring was late, and seeding was from two to three weeks behind normal time. This was followed by extreme drought and late frosts. Much of the seed sown did not germinate, and a great deal of what did grow was frozen back by the June frosts. The total rainfall up to the end of August was 3·94 inches, which is the least

for the growing period in the history of the Farm. Wheat stood the unfavourable weather the best of any, and yielded from one-half to two-thirds of normal. Other grains were less than half a crop, and forage crops were still more seriously affected by the drought.

METEOROLOGICAL RECORDS.

Month.	Highest Temperature F.	Lowest Temperature F.	Mean Temperature F.	Total Rainfall.	Total Snowfall.	Hours Bright Sunshine.
1917.	°	°	°	Inches.	Inches.	Hours.
April	56·0	13·0	32·1	.....	11	147·7
May	93·0	19·8	47·1	0·14	.....	293·5
June	96·9	26·0	58·1	1·76	.....	227·7
July	101·2	32·5	67·2	1·26	.....	283·7
August	94·0	29·0	62·2	0·78	.....	271·8
September	90·4	21·2	55·1	1·68	.....	179·1
October	71·0	2·0	31·8	0·14	8	110·2
November	61·0	15·0	33·3	0·10	½	123·2
December	34·9	−40·0	−6·3	.....	4	86·2
1918.						
January	28·5	−41·0	−4·6	.....	3	93·0
February	39·5	−38·0	0·9	.....	9	132·3
March	64·2	−6·5	28·0	0·07	6	167·3
Total	.....	.....	.....	5·93	41½	2,115·7

LIVE STOCK.

Horses.—There are twenty-one horses on the Brandon Farm. Of this number, four are pure-bred Clydesdale mares, two of which are in foal, the other two being exceptionally good yearling and 2-year-old mares. Owing to building operations on the horse and cattle barns not being completed until well into the winter, it was impossible to conduct any experimental work that time of year.

Cattle.—An experiment was conducted with some steers to determine the value of silage in the ration. The steers were divided into two equal lots of eleven steers each, one lot receiving grain, hay and silage, and making average gains of 140·6 pounds each at a cost of $13.40 per 100 pounds gain; and the other lot which received grain and hay only made average gains of 143·7 pounds each at a cost of $15 per 100 pounds gain. Another experiment was conducted comparing the feeding ability of high-grade steers as compared with ordinary steers such as are sold as feeders in the stockyards. The high grade steers made average gains of 239·1 pounds at a cost per 100 pounds gain of $14.24, and showed a labour income and profit per steer of $22.76, with a labour income and profit per $100 invested in steers and feed of $21.45, while the ordinary steers made average gains of 216·1 pounds at a cost per 100 pounds of $15.71 with a labour income and profit per steer of $20.89, and a labour income and profit per $100 invested in steers and feed of $22.11.

There are at present forty-one head of registered Shorthorns and four grades in the herd. One Shorthorn cow—Ottawa Janet 4th—gave 12,087 pounds of milk during the past year, but failed to calve in time to qualify in the Record of Performance.

The cost of raising a heifer from birth to one year was found to be $60.49, and from raising a heifer from one year to two years the cost was $37.40. This is very high and is due to the increased cost of all classes of feeds.

Sheep.—The grading up of range ewes with a pure-bred Oxford Down ram was continued during the past year, and there is now a very good flock of high-grade Oxford Down ewes as well as some good pure-breds.

The wool clip averaged 9·25 pounds per sheep, as compared with 9·2 pounds for the previous year. The lamb crop was good, averaging 1·25 lambs per ewe.

Swine.—Berkshires and Yorkshires are the breeds kept, and a number of experiments were carried on during the year. A comparison of pasture versus dry lot feeding was made. Two equal lots of pigs, twenty in each lot, were fed the same ration except that one lot had access to good pasture and the results clearly proved the value of pasture, as the lot on pasture gained at a cost of $6.17 per 100 pounds, while the dry lot cost $7.01 per 100 pounds. This made the return per acre from the pasture amount to $26.38. Another experiment was carried on to determine the feeding value of pigweed seeds when fed to hogs. The pigs were divided into three equal lots of ten pigs in each lot. One lot which was fed crushed barley and feed flour made a total gain of 294 pounds at a cost of $10.40 per 100 pounds gain. Another lot received crushed barley and boiled pigweed seed, and made a total gain of 175 pounds at a cost of $14.02 per 100 pounds gain. The third lot received crushed barley, feed flour, and boiled pigweed seed and made a total gain of 268 pounds at a cost of $12.50 per 100 pounds.

An experiment to determine the value of grade A screenings as compared with other feeds was carried on during the winter. The pigs used were upwards of 100 pounds in weight, and, owing to the very high price of the other feeds, the screenings compared very favourably with them. Lot 1, which received crushed screenings alone, made gains at a cost of $10.10 per 100 pounds. Lot 2, which received crushed barley alone, gained at a cost of $20 per 100 pounds. Lot 3, which was fed equal parts of feed flour and screenings, gained at a cost of $18.70 per 100 pounds. Lot 4 was fed equal parts of shorts and screenings and gained at a cost of $13.80 per 100 pounds, and lot 5, which was fed equal parts of shorts and barley, gained at a cost of $15.40 per 100 pounds.

POULTRY.

Two breeds of poultry are kept, the Barred Plymouth Rock and the White Wyandotte. The birds are housed in portable colony houses, each house accommodating thirty hens. There are various makes of incubator used, and all are giving fairly good hatches. The chicks are brooded in one of the colony houses, using a large coal brooder, which has proved very satisfactory. Crate-fattened cockerels gave much better returns than others fattened while allowed to run loose in the pen. Grade A screenings has been successfully used in the place of other grains, principally wheat and barley, which had become very high priced. Better results were obtained by using it in the dry mash than by feeding it whole.

BEES.

Thirteen fairly strong colonies came through the winter and continued to do well during the spring, but the absence of bloom, owing to the extreme drought, made the honey crop very light and necessitated heavy feeding before the hives were put into the cellar in the fall. No swarms issued during the summer.

FIELD HUSBANDRY.

Rotations.—The following rotations have been under test at this Farm for a number of years:—

"D", four years' duration (wheat, wheat manured, oats, summer-fallow): This is purely a grain-growing rotation, except that manure is applied every four years.

"E", four years' duration (wheat, wheat, oats, summer-fallow): This is exactly the same as "D" except that no manure is applied and is a typical grain-growing rotation.

"F", five years' duration (wheat, wheat, corn or roots, oats or barley, clover hay): This is a mixed farming rotation suited to conditions where it is desired to grow both a large amount of wheat and a large amount of fodder for stock.

"G", six years' duration (wheat, wheat, oats or barley, clover hay, pasture, corn or roots): This is also a mixed farming rotation and allows for pasture for stock as well as cropped land.

"H", six years' duration (wheat, wheat, summer-fallow, oats, hay, pasture): This rotation provides both grain crops and hay crops but omits hoed crop.

"I", six years' duration (flax, oats, summer-fallow, wheat, hay, pasture): This rotation is of similar character to "H" but substitutes flax for one of the wheat crops.

"Q", eight years' duration (roots and peas, wheat or oats, hay, hay, pasture, pasture, pasture, green feed and rape). The land used in this rotation is light and gravelly and is therefore used as a sheep farm.

"W", ten years' duration (wheat, wheat, corn or roots, oats, barley, alfalfa, alfalfa, alfalfa, alfalfa, alfalfa): This rotation is adapted to a dairy or pure-bred stock farm where the chief object of crop growing is the production of a large quantity of good fodder.

The table which follows shows the average cost per acre of operating these rotations, including rent, use of machinery, and all the cost of handling the land and producing the crop (but not marketing). It also shows the average return per acre, and the resultant profit. These figures are based on normal pre-war prices; if present prices were used, much larger returns and profits would be shown:—

Rotation.	Cost per Acre of Operation. Average of 5 years.	Returns per Acre. Average of 5 years.	Profit per Acre. Average of 5 years.
	$	$	$
"D"	10 01	12 85	2 87
"E"	8 37	11 39	3 02
"F"	12 16	18 41	6 25
"G"	11 94	19 36	7 42
"H"	8 54	12 11	3 57
"I"	8 47	12 94	4 47
"Q"	7 61	9 51	1 90
"W" (3 years only)	11 39	19 99	8 60

Cultural Experiments.—Deep ploughing is giving rather better results than shallow, though the figures obtained are not as conclusive as would be expected.

One ploughing of summer-fallow is giving equally as good results as two and means less work.

The substitution of a pasture crop for bare fallow has reduced the following wheat crop. June ploughing of summer-fallow has proven much better than July.

In seeding down grasses, better results have been obtained where seeding has followed corn or summer-fallow, than where grain was the previous crop, and the larger the number of preceding grain crops, the greater the difficulty in getting a good catch.

Better catches are obtained without a nurse crop than with but not enough better to pay for the loss of the grain crop.

In breaking up sod of tame grasses and clovers, best results have been obtained by breaking in July immediately after removing the hay crop and working as a summer-fallow during the remainder of the season.

In the application of barnyard manure on stubble land for growing wheat, oats or barley, best results have been obtained with all three grain crops by applying in the fall and ploughing in. The same result was also obtained in manuring for corn.

The substitution of grain crops ploughed in for green manure instead of bare summer-fallow resulted in a decrease in yield. Where the green crops were ploughed

in early in July the yield was practically the same as on summer-fallow land, but later-ploughed green-manured land wasted too much moisture.

The results of a very extensive system of experiments with soil packers have been very inconclusive.

Seeding at various depths from one to four inches has not resulted in any definite conclusions.

The application of commercial fertilizers of various types has brought no return commensurate with cost.

CEREALS.

The usual tests of varieties of grain were conducted. Marquis wheat continues to show its superiority over other kinds under test, yielding 36 bushels 10 pounds per acre of wheat weighing 64½ pounds to the measured bushel. Banner oats gave the highest yield this year and has the highest five-year average. Results in barley were rather contradictory to results of previous years. Mackay peas have the highest yield both for 1917 and for five-year average.

FORAGE CROPS.

The yields of forage crops were the lowest in many years, as they suffered the most from the drought of any type of crop. Northwestern Dent corn was the highest yielding, with a crop of 8 tons 1,125 pounds of green fodder per acre. Leviathan sugar beet was the highest-yielding mangel, and Durham the highest-yielding turnip. Carrots and sugar beets were also tested. Grasses, clovers, and mixtures were tested for hay production, and as usual the different strains of alfalfa exceeded all other kinds. Western rye grass was the most productive grass. A new set of grass and clover plots was sown. Among annual crops for hay production, oats cut green gave best results.

HORTICULTURE.

A large number of varieties of vegetables were tested for the purpose of determining the most suitable sorts for this climate. Also cultural tests for the obtaining of information on the best methods of growing of different kinds of vegetables, were conducted. The season was unfavourable for vegetables, and the crop was below average.

Fruit bushes and trees gave poor results; much of the bloom was destroyed by spring frosts, and the drought interfered with the development of fruit.

The flowers and trees on the grounds were not as attractive as usual, but demonstrated what could be done under drought conditions.

BUILDINGS.

New cattle barn, horse barn, and general utility buildings were erected to replace those lost by fire. They were completed during the winter of 1917-18, and have now been occupied. They are proving very satisfactory for the purposes for which they were built.

EXHIBITIONS.

No exhibition work was undertaken on account of lack of buildings in which to store and prepare exhibits.

MEETINGS.

The Superintendent addressed the annual meeting of the Manitoba Dairy Association on "Growing Winter Feeds for Dairy Cattle," the annual meeting of the Agricultural Fairs' Association on "The Work of the Experimental Farms," and the Potato Conference held in Winnipeg in February, 1918, on "Methods of Potato Growing for Manitoba." He also spoke at a number of farmers' meetings held at various places throughout the province. His assistant gave some help to the Manitoba Agricultural Extension Service in the holding of short courses, giving lectures and demonstrations on live stock at several of their short course schools.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE SUPERINTENDENT, W. H. GIBSON, B.S.A.

The precipitation during the growing season of 1917 was unusually light and insufficient for the maximum production of cereal and forage crops. The seasonal rains were not general over the province and, as a result, in many parts of southern Saskatchewan the grain crops were comparatively light. Spring opened late with seeding general May 6 to 8. Pasture, hay, and forage crops were light, resulting in a scarcity of feed and the marketing of a large percentage of thin, unfinished cattle.

METEOROLOGICAL RECORDS.

Month.	Temperature.					Rainfall.		Snowfall.		Total Sunshine.
	Maximum.		Minimum.		Mean.					
	Date.	°	Date.	°	°	Days.	Ins.	Days.	Ins.	hours.
January	8	40	31	−43	− 7·00	.....	.....	7	14·50	39·2
February	6	34	2	−50	− 5·75	.....	.....	4	10·00	85·6
March	29	36	3	−30	14·97	.....	.....	4	4·25	111·8
April	22	49	1	2	31·83	2	0·40	2	7·00	136·8
May	15	86	29	20	49·55	3	0·41	.....	.....	300·4
June	8	86	20	28	55·27	10	2·67	.....	.....	214·2
July	27	104	1	33	66·03	6	1·36	.....	.....	320·7
August	13	89	27	33	60·32	7	1·83	.....	.....	269·2
September	22	87	8	20	52·73	3	0·71	.....	.....	175·8
October	1	66	21	4	31·13	1	0·14	4	12·50	106·9
November	8	60	26	8	34·27	.....	.....	2	5·00	112·8
December	17	35	14	−38	− 9·19	.....	.....	7	10·00	35·7
						32	7·52	30	63·25	1,909·1

LIVE STOCK.

Horses.—The horses at Indian Head number twenty-three head, twelve of which are pure-bred Clydesdale mares and fillies. Much interest is manifested in the horse-breeding operations at this Farm. Already a number of pure-bred mares have been imported into the district. Horse-breeders' clubs have been organized under the Federal scheme with a view to improve the horses of the section.

The usual experiments were conducted relating to the cost of keeping work horses, cost of wintering idle horses, together with the cost of raising fillies to two and three years old. The costs are as follows: heavy draught horses, 1,600 pounds and over, $131.38 per annum; general-purpose horses, 1,200 pounds and over, $119.46 per annum; Clyde filly, 2 to 3 years old, $54.78 per annum; two Clyde fillies, 1 to 2 years old, $51.28 per annum.

Cattle, Shorthorns (Dual-purpose).—The entire herd numbers forty-six head, three stock bulls and forty-three females. The herd is handled strictly along dual-purpose lines. Rigid selection is practised, and only females conforming to beef type and milk production are retained in the herd. These cows are bred to sires of the very best blood lines that can be obtained. Already a number of heifers have freshened which bid fair to outclass their dams at the pail. Many inquiries are received for young bulls of the dual-purpose type and, as a consequence, the surplus are readily sold at good prices.

Forty-five grade Shorthorn steers were purchased in the fall of 1917 and divided into three lots for the purpose of gaining data relative to the value of the different

kinds of shelters for the winter feeding of steers in Saskatchewan. The shelters under consideration are stable, open corral with high board fence, and shed with open front and southern exposure. From experiments concluded, the question of buildings need not deter a man from entering the live-stock business. It has been demonstrated time and again by the Experimental Farms that cattle do relatively better outside than when housed in expensive barns. Where natural shelters are not available, a corral with a high board fence, about 7 feet high, and a rough, straw-covered shed will be found very beneficial as a protection from the stormy weather. These shelters are easily and cheaply constructed on the average farm, and will be found most satisfactory for all classes of live stock. Through the agency of live stock, the rough feeds and low-grade grain can be profitably utilized.

Sheep.—The flock numbers ninety-five head pure-bred Shropshire and grade sheep. The grading experiment with range ewes and pure-bred rams was continued. Feed costs of the entire flock were kept throughout the winter. The average cost of wintering pure-bred Shropshire ewes was $5.50; pure-bred Shearling ewes, $5.13; grade Shropshire ewes, $4.06; grade Oxford ewes, $4.20; grade ewe lambs (mixed lot), $2.98.

Swine.—The entire herd numbers fourteen head, six York sows and one York boar, six Berk sows and one Berk boar. Preparations are under way for more extended work with hogs.

POULTRY.

The breeds of poultry maintained on the Farm are White Wyandottes and Barred Plymouth Rocks. These breeds are well adapted to prairie conditions. The total number of eggs laid during the winter months, October to March 31, was 8,491. The average cost of production per dozen for the winter months was 21.75 cents and the selling price 40.70 cents per dozen, leaving a net profit of 18.95 cents per dozen.

Trap-nesting was carried on throughout the winter months, and individual records of all hens and pullets kept.

During the year 810 chickens were hatched by artificial incubation.

Ninety-six cockerels were crate fed for three weeks, and realized a total profit of $22.25.

Work with poultry is expanding rapidly. Many inquiries are received for hatching eggs and breeding stock.

FIELD HUSBANDRY.

Investigational work in field husbandry is mainly with rotations and cultural methods. In connection with the rotations, records are kept to ascertain the cost of production of the different field crops and the suitability of the rotations to southern Saskatchewan conditions.

The following rotations are under investigation:—

Rotation "C"—three years' duration (summer-fallow, wheat, wheat). In the grain growing districts this rotation is generally practised.

Rotation "J"—six years' duration (summer-fallow, wheat, wheat, oats seeded down, hay, pasture).

Rotation "P"—eight years' duration (summer-fallow, wheat, wheat, summer-fallow, hoed crop, barley seeded down, hay, pasture.)

Rotation "R"—nine years' duration (summer-fallow, hoed crop, wheat, oats, summer-fallow, wheat, oats seeded down, hay, pasture).

Rotations "J", "P" and "R" are well suited to mixed farming and stock raising.

Crop Yields.—The yields of wheat varied between 21 bushels and 20 pounds per acre on stubble land and 47 bushels and 42 pounds per acre on summer-fallow. Oats—43 bushels and 22 pounds and 99 bushels and 6 pounds per acre. Barley—20 bushels and 57 bushels 34 pounds per acre. Flax—9 bushels 20 pounds and 12 bushels 20 pounds per acre. Field peas—18 bushels and 35 pounds per acre.

Cultural Experiments.—Experiments in the various methods of treating land so as to obtain the highest yield and yet retain the fertility of the soil have been carried out on the Indian Head Farm for a number of years. Below are comments on the more important results obtained.

Deep ploughing, e. g., 6 to 8 inches, gives ample compensation for the extra labour entailed, and the result is more prominent in the second crop, as is the case with subsoiling, but with the latter the increase in yield does not compensate for the extra expense.

Ploughing summer-fallow twice is not necessary when the land is ploughed early and for depths varying from 6 to 8 inches.

Autumn ploughing of stubble materially increases the yield, while there is no advantage in stubble burning. For oats, fall cultivation and spring ploughing are advised.

The best time for applying manure is in autumn on first-year stubble, and plough under immediately.

The timely use of the packer and harrow after ploughing will conserve moisture and increase the yield.

Seeding to a depth of 3 to 4 inches places the seed in contact with the moisture, and ensures the germination essential to a large yield.

Seeding down to hay is best done after a hoed crop or summer-fallow, either with or without a nurse crop.

For breaking sod, plough early and work as summer-fallow.

CEREALS.

The regular work with cereals was conducted on uniform test plots of fallow and stubble land. Twenty varieties of spring wheat, twelve of oats, nineteen of barley, seven of peas, and three of flax were tested. Marquis headed the list of named varieties of wheat with an average of 48 bushels per acre. Victory was the highest yielding oat, with 129 bushels and 14 pounds per acre. Danish Chevalier, the highest yielding barley, gave 63 bushels and 16 pounds. Golden Vine peas yielded 30 bushels and 40 pounds. Premost flax gave 11 bushels and 40 pounds per acre.

FORAGE CROPS.

The regular experiments were carried on with forage plants. However, owing to unfavourable seasonal conditions, the yields were considerably lower than in previous years. A 15-acre field was sown to peas and oats June 22, cut in the early dough stage, and filled into the silo. This mixture makes an excellent feed for cattle, and may be used as a substitute where corn cannot be grown successfully.

The varieties of corn most suitable for the Indian Head district are North West Dent, Early Longfellow, and Compton's Early. Free Press, Gehu, and Quebec Yellow are earlier but do not produce so much forage.

Roots.—Twenty-seven varieties of turnips, eleven of mangels, ten of carrots, and three of sugar beets were tested. In addition, four varieties of soiling crops were grown. The yield for the season was about normal.

Clovers and Grasses.—Investigations are under way to ascertain the comparative values of the different hays and pasture grasses. Alfalfa is well adapted to the soil and climatic conditions of Saskatchewan. The most suitable varieties are Grimm and Baltic.

HORTICULTURE.

Fruits.—The fruit crop was a complete failure, caused by spring and summer frosts. Cross-bred and Standard apple trees were almost all badly winter-killed, possibly owing to the heavy growth of wood, which was not matured when winter set in.

Vegetables.—The usual variety tests and cultural experiments were carried on during the season. The potato crop was not heavy in yield but the quality was exceptionally good.

Ornamental Gardening.—Annual and perennial flowers gave a good show of bloom, while bulbs were very poor, having been received too late the previous fall.

Trees and ornamental shrubs came through the winter in good condition. A few of the more tender varieties were slightly winter-killed on account of the growth of the previous season not being matured. No bloom was produced by any but a few late varieties of lilacs.

BUILDINGS.

During the year a permanent poultry house, 16 feet by 32 feet, was erected with accommodation for 100 hens. A permanent brooder house, 16 feet by 45 feet, with eleven hovers, was also built. The sheep barns were moved to a permanent site and remodelled, facilitating future work in sheep husbandry.

EXHIBITIONS.

In order to cover as much territory as possible, the exhibition work was divided into two circuits, circuit No. 1 visiting towns in the southern part of the province on the Weyburn-Estevan line. Circuit No. 2 worked on the main line between Moosejaw and Moosomin. The exhibits attracted much attention, particularly at the smaller fairs.

EXPERIMENTAL STATION, ROSTHERN, SASK.

REPORT OF THE SUPERINTENDENT, WM. A. MUNRO, B.A., B.S.A.

THE SEASON.

The effects of the hailstorm of August 3, 1916, were very evident throughout the season of 1917 on the shrubs and trees. Many of the leaders in the evergreens had been broken, and careful pruning and training were necessary to bring a lateral into place to retain the former shape of the tree. Most of the poplars were killed back several feet, but none was killed outright. The plum and apple orchards were badly killed back, and had to be severely pruned. The raspberry canes had all been killed, and the growth of 1917 being all new canes there was no crop last season.

The precipitation of 1917 was above the average and well distributed throughout the season, as a consequence of which all crops were above the average.

METEOROLOGICAL RECORDS.

Month.	Temperature F.			Total Precipitation.	Total Sunshine.
	Highest.	Lowest.	Mean.	(Inches).	(Hours).
1917.					
April	48·0	−3·8	30·015	1·21	184·5
May	89·3	22·8	52·085	0·32	336·1
June	82·3	27·7	56·0	3·42	287·6
July	87·8	40·7	65·76	1·16	395·3
August	87·4	37·7	60·235	1·94	300·8
September	84·3	22·7	52·975	0·64	216·0
October	66·9	−3·1	33·69	0·75	152·6
November	58·0	8·7	34·24	0·13	170·9
December	18·7	−51·3	−14·5	2·2	64·5
1918.					
January	33·0	−45·3	−7·4	1·4	87·6
February	37·3	−42·5	−0·9	0·4	146·0
March	53·2	−26·8	20·35	3·5	142·6
Total	.....	.....	.....	17·07	2,484·5

LIVE STOCK.

Horses.—There are sixteen horses on the farm, two of which are drivers, and five of which are in foal. It is generally considered that four work horses are necessary for a quarter-section on an ordinary farm but on the Station the work has been kept well in hand with fourteen work horses per section, although at times the work was somewhat strenuous. The horses were stabled at night but were out at a straw stack during the day all winter.

Cattle.—Sixty steers were purchased in October, forty of which were two and a half years old and in fair flesh, and twenty, three and a half years old and in good flesh. The younger steers cost $7.75 per hundred pounds, and the older $9 per hundred. They were all fed oats and barley chop and barley straw at the same rate per thousand pounds weight of steers, and twenty of the younger steers were fed from 5 to 10 pounds of turnips daily in addition. The older steers sold for a higher price than the younger, but not sufficiently higher to warrant the spread in the cost. The small amount of roots fed was well repaid in the increase in weight and the better quality of those fed the roots.

There are now two Holstein cows, one 2-year-old heifer, one 2-year-old bull, and one 1-year-old heifer, all pure bred, and two cows, two 2-year-old heifers, and three 1-year-old heifers, all grade Shorthorns, on the farm.

Sheep.—One hundred range ewes were purchased in December, 1915, for $1,000. By December, 1916, approximately $800 of wool and mutton had been sold, and there were 114 ewes on hand. By December, 1917, there had been sold during the year approximately $1,200 of wool and mutton, and there were 122 ewes in the flock. Leicester rams were used on these ewes.

Hogs.—A start was made in hogs in December, 1917, by obtaining six young sows and a boar of good Berkshire breeding.

FIELD HUSBANDRY.

Winter rye on small plots has been tried on the Station for several years without a failure (except once from hail in 1916) and this in the case of both early and late sowing and late and early pasturing. In July, 1917, oats and winter rye were sown together, and a small crop of green oats cut from it in the same autumn with a most promising crop of winter rye coming through the winter.

All grain crops were above the average in yield in 1917.

Owing to changes in the rotation fields due to the extension to the Station, there was no information to be derived from rotation work in 1917.

FORAGE CROPS.

Rye Grass.—Hay, principally all rye grass, has been grown in rotations for eight years, and in only two seasons have there been good yields. But in the spring of 1918 the good effects of such work on the soil were seen when the soil on farms all around drifted, while there was no drifting where rye grass had been grown on the Experimental Station.

Corn.—The corn of 1917 was a failure owing to early fall frosts. There have been only two good fodder corn crops in eight years.

Alfalfa.—Attempts were made to grow alfalfa broadcast without much success, but a crop in 1917 from seed sown in rows 24 inches apart gave a good yield and promises well for permanency.

Roots.—Turnips furnish the best succulent crop grown in this district. Mangels germinate poorly, and carrots are still more expensive in thinning and harvesting than are the turnips.

HORTICULTURE.

Fruits.—Red, white, and black currants have given very satisfactory yields every year since they began fruiting. Gooseberries have never yielded, and raspberries have always done well till 1917, which failure was due to the killing of the canes by hail in 1916. The plum orchard has not yet come into bearing, but the fact that there are a number of plum orchards in the district giving good yields is sufficient evidence that there are good prospects for plum culture. The apple orchard was too severely injured by hail in 1916 to give any showing of fruit in 1917. The strawberries came through the winter in good condition, and yielded the best in 1917 of any season since the Station started.

Vegetables.—All garden roots, cabbage, brussels sprouts, kale, peas, and beans always do well here, and yielded extra well last year. Squash and tomatoes are doubtful crops, although in 1917 they did well. Tomatoes must have a good start in the hot-bed or the house, and then, after transplanting to the open, must be trained to one stalk and kept upright by being tied to a stake or to a trellis. Celery has been tried for a number of years in trenches and on the level, with results always in favor of level planting. Celery was stored in a cool cellar, and kept in good condition till March.

Ornamental grounds.—The climate is too dry to produce such a thick growth on the lawns as in moister climates, although Kentucky Blue grass and White Dutch clover give very satisfactory results. The trees and shrubs are improving in appearance every year, and now form a splendid background to the flower border. The show of flowers is very attractive, from the tulips in May till the asters are frozen in the autumn.

FARM IMPROVEMENTS.

Buildings.—A granary 30 feet by 60 feet, 12 feet high, was built in October. This has an 8-foot driveway down the centre with two 20-foot bins, four 10-foot bins, a 20-foot sample room and a 20-foot work room. This will form accommodation for grain not held by the four 12-foot by 16-foot portable granaries.

Fencing.—Four and one-half miles of fencing were constructed in 1917. This was of woven wire eight strands on 8-foot cedar posts placed 3½ feet in the ground.

Roads.—There were 4½ miles of road graded, which gives ready access to any part of the farm.

EXHIBITIONS.

A large Experimental Farms exhibit was prepared and sent in charge of a competent man to eight fairs throughout the northern part of the province. Much favourable comment was received on the merits of this display.

EXPERIMENTAL STATION, SCOTT, SASK.

REPORT OF THE ACTING SUPERINTENDENT, M. J. TINLINE, B.S.A.

THE SEASON.

The weather during April was unusually cold, spring opening up very late. Seeding commenced on the last day of the month, and with the soil in an unfit condition for cultivation. Dry weather during May permitted rapid progress with seeding, but spring frosts in May and June injured and retarded the growth of grain crops. When dry weather set in it brought the weeds on more rapidly than the grain, resulting in many very weedy fields. The drought continued all through the balance of the summer, the total rainfall for the six growing months only amounting to 4·86

inches. This is considerably less than one-half the average amount. Crop yields of all kinds were light, and in some sections almost a failure. From the experimentalist's standpoint the season was fairly satisfactory, since it was a good year to bring out the most vigorous varieties, and to show the best cultural methods for conserving moisture.

On the Station a large field of wheat yielded an average of 25 bushels per acre. Oat yields were not so satisfactory, although some of the best fields had given promise of fair returns. Potatoes and root crops gave lighter yields than usual. Very little fall ploughing was done in the district, owing to the dry autumn.

METEOROLOGICAL RECORDS.

Month.	Temperature F.			Precipitation.			Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	
1917.	°	°	°	Inches.	Inches.	Inches.	Hours.
April	48·8	5·0	31·8	0·52	0·49	1·01	134·0
May	89·4	19·2	51·26	0·39	0·02	0·41	300·7
June	90·0	25·6	55·0	0·88	.....	0·88	294·1
July	94·0	37·2	65·2	1·03	.....	1·03	363·0
August	90·0	34·7	59·7	1·16	.....	1·16	284·2
September	85·8	23·0	52·2	0·37	.....	0·37	180·4
October	69·2	− 4·0	33·8	.....	0·12	0·12	126·6
November	64·8	1·2	36·7	0·25	.....	0·25	151·1
December	27·8	−43·8	−11·8	.....	0·55	0·55	67·8
1918.							
January	37·0	−42·8	− 4·69	.....	0·77	0·77	62·5
February	38·2	−43·0	2·93	.....	0·49	0·49	111·1
March	60·0	−25·2	20·6	.....	0·57	0·57	168·1
Total for the year	.....	.....	.....	4·60	3·01	7·61	2,243·6

LIVE STOCK.

Horses.—There are seventeen head of horses on the Station. Of these, seven are home-bred grade Clydesdales. Experiments to determine the cost of raising colts and the cost of feed for work horses have been continued.

Cattle.—One milch cow is kept to supply milk to the employees on the Station. Two cars of fat steers used in the feeding experiments in 1916-17 were sold on May 20, at a profit over feed cost of $16.75 per steer for the lot fed inside a straw shed, and $12.57 per steer for the lot fed in an open corral. A carload of feeder steers was purchased on September 27, at a cost of 7 cents per pound. These have been used in testing out methods of housing.

Sheep.—The flock of sheep on the Station has been maintained at 100 breeding ewes. Only a fair lamb crop was secured, but, with the high prices for mutton and wool, the return values have been most encouraging, the total sales alone amounting to $515.72.

Swine.—Six brood sows and one boar of the Berkshire breed constitute the foundation stock for the Station herd. The first litters were farrowed in August and September, with an average of seven pigs per litter. These young pigs wintered over in a straw shed and came out in the spring in a good, thrifty condition. The brood sows were fed 5 pounds each per day of meal, and slept in small, portable cabins.

POULTRY.

A commencement with poultry was made. Two pens of 50 birds each of the Barred Plymouth Rock breed were secured; one pen were late-hatched pullets, the other 2-year-old hens. A comparison is being made to determine the egg production, fertility of the eggs, and "livability" of the chicks from the two pens.

FIELD HUSBANDRY.

Rotations.—The comparative tests with the several rotations started on the Station in 1911 continue to furnish some valuable data on the cost of production of field crops, as well as on the best arrangement of crops.

Crop Yields.—Marquis wheat on summer-fallow yielded 25 bushels per acre. On new land, Banner oats yielded 45 bushels per acre, Ligowo oats 41 bushels, and O.A.C. No. 21 barley 34 bushels.

Cultural Experiments.—Five rates of seeding and five dates of seeding grain crops were tested. Lighter seeding than is commonly practised gave the best returns, and sowing about May 1, the heaviest yields. Ploughing down rotted manure has continued to show a good profit. The average increased yield for three years when wheat was sown on manured land was 6 bushels per acre; when oats were sown, 21 bushels; and when barley was sown, 15 bushels.

Further cultural experiments under way are: Prairie breaking, summer-fallow and stubble treatment; seeding down to grass and clover; breaking up cultivated grasses; testing out soil packers; depths of seeding and seed-bed preparation.

Cereals.—Fifteen varieties of wheat, eight of oats, ten of barley, seven of peas, four of flax and four of rye were tested. Varieties under trial on the Station for the first time were Kitchener wheat, Alsasman oats, and three varieties of barley, Charlottetown No. 80, Albert 0-54, and Stella 0-58.

The yields of wheat on the test plots varied from 9 bushels 50 pounds to 21 bushels 6 pounds, Kitchener giving the heaviest yields. With oats, the yields ran from Daubeney with 29 bushels to Victory with 57 bushels per acre. The Charlottetown No. 80 barley gave a yield of 21 bushels per acre while Success, the beardless sort, only yielded 12 bushels.

In all, forty-nine farmers purchased seed grain at the Station during the year.

FORAGE CROPS.

Indian Corn.—Thirteen varieties of Indian corn were tested. The yields were light, Salzer's North Dakota again giving the heaviest yields. Longfellow and North-western Dent yielded but little less.

Roots.—Twenty-nine varieties and strains of turnips were tested, the yields averaging from 270 to 575 bushels per acre. Of the ten varieties of mangels grown, Giant Yellow Half Long yielded 451 bushels per acre, the lowest yielding variety giving 363 bushels. The average yield from three varieties of sugar beets was 333 bushels per acre, and from six varieties of carrots 130 bushels.

Grasses and Clovers.—Yields were secured from eight kinds of hay crop and from eight combinations of hay crop. Of these, Western rye grass by itself gave the heaviest yields, with western rye grass and red clover second. The red clover when sown alone winter-killed.

Alfalfa, in rows 30 inches apart, gave heavier yields than alfalfa sown in rows 6 inches apart. Two cuttings were secured from the plot of sweet clover. A fairly comprehensive set of experiments was started with grass and clover during 1917. Thirty-two one-fortieth acre plots were seeded down, the objects being to test out the quantities of seed to use and the best method to follow in seeding down. Of the annual hay crops, oats, vetches, and peas gave the best returns, and broad-leaved Essex rape the heaviest yields of the five soiling crops used.

HORTICULTURE.

Fruits.—The orchard destroyed during 1915-16 was replanted with seedlings from hardy standard apples. Only trees showing indication of individual hardiness were used. The native plum trees made a good growth, notwithstanding the drought.

Of the small fruits, the Dakota strawberry yielded well; the Senator Dunlap being later, was affected by the dry weather. Black currants fruited well, but the crop of red and white kinds was light. The yields from the raspberries were much lower than usual and the berries quite small.

Vegetables.—A good crop of the hardy kinds of vegetables was harvested. The success with this class of crop was largely due to the moisture stored in the soil during the previous season by summer-fallowing. Of the more tender sorts a good crop of green tomatoes was secured.

Potatoes.—The experiments with potatoes have shown the importance of planting earlier than is commonly practised and the advisability of using larger-sized sets. Early maturing sorts have also proved to be the most satisfactory for table use. The profits per acre from potatoes after deducting the cost of seed, labour, and rent of land each year, has for three years been between $70 and $80.

Ornamental Gardening.—The Russian poplar (*Populus Petrowskyana*) is proving to be one of the hardiest and most rapid-growing trees on the Station. Two kinds of evergreens that are thriving well are the white spruce (*Picea alba*) and lodgepole pine (*Pinus contorta Murryana*). The Caragana hedges have made a splendid growth, and are protecting the orchard to a considerable extent.

In the tests of annual flowers, a greater number than usual were sown directly in the flower beds, and a comparison made with flowers sown in hotbeds and transplanted. Paeonies, delphinium, scarlet lychnis, of the perennial flowers, made a good showing and thrived well.

FARM IMPROVEMENTS.

One permanent poultry house for 100 birds was erected; also three smaller portable houses. A poultry administration building was also constructed. A roadway through the Station was opened up and fenced. Several small fields near the sheep barn were fenced in to test the value of different crops for pasture.

EXHIBITIONS.

The circuit for the Scott exhibit was arranged to cover the northern half of northwestern Saskatchewan. The fairs visited were Unity, Saskatoon, Macklin, Kerrobert, Lloydminster and Lashburn.

MEETINGS.

During the summer months the usual number of farmers' picnics were held on the Station. Eight hundred persons were estimated to have attended one of these gatherings. In the winter season, the Superintendent visited a number of Grain Growers' Associations, and discussed some of the experiments conducted on the Station.

VISITORS.

The influx of automobiles has resulted in a marked increase in the number of visitors. It is estimated that 3,300 persons visited the Station during 1917-18.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

THE SEASON.

The conditions at the beginning of the season of 1917 were extremely promising, especially during April and the greater part of May. The prospects at that time were fully as good as during the record-breaking season of 1915, because of the extremely liberal amount of moisture that was carried over in the soil from the fall of 1916, coupled with the fact that the frost did not draw out of the ground as early as is usual, thus avoiding the customary excessive evaporation that takes place during the windy weather in the latter part of March and throughout April.

The winter of 1916-17 was rather severe. There was a cold dip in the latter part of December, 1916, when the thermometer went to 36 degrees below zero. The thermometer dropped to 41 degrees below zero in both January and February, and the weather during March was steadily cold although there were no very low dips.

Frost did not thaw out of the ground until well into April. Work on the land was not possible until the week beginning the 9th. Owing to the excessive amount of moisture in the soil, farmers generally found that it was not possible to proceed with seeding as rapidly as usual owing to the fact that in nearly all fields there were low spots that were too wet to work till the 20th or 25th of the month. So, owing to the fact that spring opened up ten days to two weeks later than is usual in the district, coupled with the fact that the low spots were too wet to work and that the precipitation during the month was somewhat greater than the average, there was not nearly as much seeding finished by the end of April as is customary, and a large part of the wheat seeding had to be done in May and was not completed till the 20th.

The favourable conditions from the moisture standpoint started all crops well, but the drought during May and June was disastrous, and only those crops sown on summer-fallow in the greater part of the district from Lethbridge east were able to stand it. The total rainfall, as measured at the Station from April 1 to the 3rd of August, was only 5·31 inches. Considering this small amount, the yields of grain that were obtained are certainly remarkable, and must be attributed in large measure to the fact of so much moisture being held over in the subsoil from the fall before.

The last frost in the spring was on June 4, when 1 degree was registered, and the first frost in the fall was on September 5, when 2 degrees were registered. In the following table will be found data regarding the weather during the year:—

METEOROLOGICAL RECORDS.

Month..	Temperature F.			Precipitation.	Sunshine.
	Maximum.	Minimum.	Mean.		
1917.	°	°	°	Inches.	Hours.
April	61·0	11·5	38·0	1·57	133·1
May	81·0	16·0	49·0	0·95	224·3
June	82·0	31·0	55·9	1·42	384·5
July	93·0	38·0	66·7	1·37	400·7
August	89·0	35·0	61·3	2·00	321·3
September	85·0	27·0	54·5	1·67	197·3
October	79·0	6·0	41·5	0·72	137·4
November	70·0	16·0	44·6	0·00	177·6
December	55·0	−31·5	− 8·2	1·13	62·5
1918.					
January	60·0	−34·5	13·8	0·46	75·1
February	54·5	−41·0	17·4	0·76	124·8
March	67·5	−10·0	32·3	0·66	162·5
				12·71	2,401·1

LIVE STOCK.

Horses.—The horses on the Lethbridge Station number fourteen, and include two pure-bred Clydesdale mares. Two grade colts were foaled in 1917.

Cattle.—The usual feeding tests were carried on during the winter of 1917-18. Thirty-eight 2- and 3-year-old range steers were purchased in December, 1917, for $8.31 per hundredweight. They were divided into three lots, and fed in the open. In the first lot were put twenty of the larger steers, and the meal ration for these was increased as rapidly as possible, the object being to finish them in as short a period as practical, while the remaining eighteen head were divided into two lots of nine each, and are to be kept on feed till late in the spring. The main roughage fed all three lots was alfalfa hay, lots one and three being given three parts of alfalfa hay and one part of green feed (oat sheaves), while lot two had alfalfa only as a roughage. They were started on meal composed of barley and oats in equal parts, but were finished on ground screenings. Lot one, made up of the twenty head of larger steers, was sold on March 31 at $12 per hundredweight, after being on feed 119 days. The net profit per head was $20.35, after allowing the following high prices for the feed given: Alfalfa hay $17, and green feed $17 per ton, meal (oats and barley) $2.35 per hundredweight, screenings (ground) $2.10 per hundredweight. The cost to produce one pound of gain was 21 cents.

Lots two and three are not sold at the time of writing this report, but have made even better gains than lot one.

Sheep.—In October of 1916, a flock of 160 range ewes was purchased, and notwithstanding the fact that nearly 10 per cent of them were killed by dogs during the winter, a handsome profit was made. The following statement is of interest:—

Total cost, 160 ewes	$1,098 50	
Cost of one ram	42 50	
Cost of 4,300 pounds grain	75 25	
Cost of 4½ tons hay	40 50	
Cost of shearing	11 40	
Wool, 809 pounds at 64 cents	.....	$ 517 76
92 ewes (present value)	.....	1,380 00
1 ram (present value)	.....	40 00
102 lambs present value)	.....	918 00
Profit	1,587 61	
	$2,855 76	$2,855 76

A winter-feeding test with two carloads of lambs was carried out along lines similar to those followed during the past three or four winters. One car was sold at the end of March, and a profit was made of $1.90 per head on the farm-reared lambs, and $1.44 per head on range lambs. The prices charged for feed were the same as those in the feeding tests with steers given above. The second car of lambs are to be sheared in early April, and will be put on the market in May.

POULTRY.

The farm flock is now composed entirely of Barred Rocks. During the summer the White Leghorns were all disposed of. After four years of trial it has been fairly well demonstrated that this breed is not particularly adapted to the district, not being a success in the winter production of eggs. Some White Wyandotte eggs were obtained, and this breed will be used another year. Owing to several changes that had to be made with the help in charge of the poultry, the work accomplished during the season was not as satisfactory as usual. Barely 200 chicks were reared. The usual work in trapnesting of the pullets has been maintained.

BEES.

The results from the apiary during the summer of 1917 were only reasonably satisfactory owing to the fact that the three colonies were not strong in the spring and did not build up fast enough during the summer to produce the usual amount of honey. One hundred and four pounds of extracted honey were obtained, and most of this came from one colony.

FIELD HUSBANDRY.

Rotations.—In connection with the work with rotations there have been no striking results obtained during the past season. The following rotations are under test:—

Rotation "A": Wheat continuously.

Rotation "B": Two years' duration (wheat; summer-fallow).

Rotation "C": Three years' duration (summer-fallow; wheat; wheat or coarse grain).

Rotation "M": Six years' duration (summer-fallow; wheat; coarse grain, manured in fall; summer-fallow; peas and oats for hay; barley or oats).

Rotation "T": Ten years' duration (summer-fallow; wheat; oats or barley; seeded to alfalfa; alfalfa hay or seed; alfalfa hay or seed; summer-fallow; hoed crop; wheat, manured in fall).

The following rotations are irrigated:—

Rotation "U": Ten years' duration (seeding alfalfa; alfalfa for the five years; hoed crop; wheat; oats; barley).

Rotation "V": Alfalfa continuously.

Rotation "X": Fifteen years' duration (seeding alfalfa; alfalfa for nine years; barley; corn; wheat; oats; peas).

Crop Yields.—The yields of field crops on dry land varied to a large extent. Anything sown or planted on summer-fallow gave very fair returns. Grain crops sown on stubble land did not do well. The yields of all kinds of hay were light. On irrigated land, conditions were different. All kinds of crops irrigated at the proper time did well.

CEREALS.

On account of the dryness of the season, the yields of all cereals on the dry or non-irrigated part of the farm were very much lighter than was the case during the two seasons previous. On the irrigated land the results were quite satisfactory.

On the dry land, Bobs and Marquis stood at the head of fourteen varieties of wheat tested, yielding 31½ bushels and 28 bushels to the acre, respectively. Of the seven varieties of oats tested, Danish Island, yielding 60 bushels and 30 pounds per acre, was the best, with Banner a close second. Eleven varieties of barley were under test, and of the standard sorts Swedish Chevalier gave the best yield, which was 40 bushels per acre. With field peas, Chancellor stood at the head of the list of seven, with a yield of 25¼ bushels per acre.

On the irrigated land there were six varieties of spring wheat tested and the two best yielding varieties were Huron, 58¾ bushels per acre, and Red Fife 57¾ bushels per acre. Of the five varieties of oats tested, Danish Island and Banner were the best with yields of 133 bushels and 129 bushels respectively. In the eleven barleys tested, Swedish Chevalier gave the best returns with a yield of 82 bushels per acre. With field peas, Golden Vine stood at the head of the list with a yield of 61 bushels per acre.

FORAGE CROPS.

Indian Corn.—Nineteen varieties of corn were grown on both the dry and irrigated parts of the farm. The yields on the former were low, White Cap Yellow Dent doing

the best with 6¾ tons per acre, weighed green. On the irrigated land the returns were much better. Comptons Early headed the list with a yield of 18 tons and 1,850 pounds per acre.

Roots.—The turnips on the irrigated land did particularly well. The highest yield was obtained from Imperial Greystone which yielded 44 bushels to the acre. On the dry land, out of the twenty-seven varieties tried, Imperial Greystone also yielded best, giving 26½ tons per acre. Twelve varieties of mangels were under test. On the irrigated land, Perfection Mammoth was the best with a yield of 24 tons per acre, and it was also the best on the dry land, giving a yield of 14 tons per acre. Of the six varieties of carrots tested, Mammoth White Intermediate with a yield of 30 tons per acre headed the list on the irrigated land, while the Imperial Short White was the best in the dry land yielding 7 tons, 1,300 pounds per acre. Five varieties of sugar beets were tested and Royal Giant did the best on both dry and irrigated land.

Grasses and Clovers, etc.—Alfalfa, which is the main hay crop on the irrigated lands in the Lethbridge district, did not yield quite as well as usual. Winter-killing was again observed to a limited extent. On the dry land the yield of alfalfa as well as of grasses was light. The yield of alfalfa seed from the different fields varied considerably, but one acre field yielded 513 pounds of cleaned seed.

Pastures.—In the various mixtures of cultivated grasses and clovers used in the permanent pasture fields on irrigated land, it has been found that the addition of alfalfa to the mixture more than doubles the carrying capacity in every case.

HORTICULTURE.

The effects of the very unfavourable season of the year previous were still more or less apparent in the growth of trees and shrubs in 1917. This was true not only with apple trees, but with shade trees and ornamental shrubs. From an experimental standpoint, however, many valuable data have been gained as to the hardiness and adaptability of certain species, for any tree or shrub that could stand the rigours of the last two seasons certainly possesses value for the district.

Fruits.—Notwithstanding the trying conditions that prevailed during the last two seasons, it is encouraging to be able to report that small fruit, such as strawberries, raspberries and red and white currants, have fruited well. On the prairies where fruit of any kind is such a luxury, farmers should not hesitate about planting out such stuff in their gardens. Of the eighteen varieties of strawberries under test, the varieties giving the best yield for the season were Senator Dunlap and August Luther. Both yielded at the rate of over 6,000 boxes per acre. With the raspberries, the Loudon gave the best yield, though the Herbert also made a good showing. The necessity of bending the canes over in the fall and covering completely with moist soil was again demonstrated for, in the test made during the winter, those not covered were dead by spring. The average yield of the red currants was better than the white. Practically all varieties of black currants died back to the ground. None of the standard apple trees that are still living had fruit, although most of the cross bred trees bore a little but the crop was extremely light.

Vegetables.—It was a favourable season for most vegetables on account of being long and fairly warm, but dry-land gardens suffered from drought. The potato crop, even on the irrigated land, was only fair but all other vegetables did better than usual. Onions matured perfectly from seed and a larger proportion of tomatoes ripened than usual. Pumpkins, squash, etc., matured a greater proportion than the average.

Ornamental Gardening.—Many varieties of annuals, herbaceous perennials, and bulbs bloomed well and added much to the appearance of the grounds. Few ornamental shrubs, however, bloomed as they were too seriously affected by the severity of the winter.

EXCURSIONS AND VISITORS.

Three excursions or farmers' picnics were held in July. Arrangements were made with the Canadian Pacific Railway to run special trains to and from the Station on July 19 from Calgary via Aldersyde, on the 20th from Manyberries, and on the 21st from High River. The weather was fair on all three days, and in addition to those who came by train a large number of the farmers arrived in their own automobiles. The excursion from Manyberries over the Lethbridge-Weyburn line brought in many farmers and their families who had never previously visited the Station. During the year the number of people visiting the farm increased considerably, as 5,550 were counted.

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

THE SEASON.

Work on the land in the spring of 1917 was begun later than in any year since the establishment of the Station. The first seed in 1917 was sown on May 1, but seeding was not completed until the early days of June. A heavy rainfall during May and early June, accompanied by cold weather, seriously delayed vegetation, and in consequence live stock made heavy demands on fodder, and were turned out on delayed pastures too early.

During the last week in June a period of warm weather began which continued throughout July and August, and forced rapid maturity of crops which in the first part of the season had promised to be abnormally late. Harvest operations began during the first week in August, became general by the middle of that month, and were further advanced on the first of September than in any season for ten years. Threshing was well under way in many districts early in September, the quality of the grain being good, and the yield fully up to the average.

A very heavy crop of both native and cultivated hay was harvested throughout this entire section of the province, and favourable weather made possible the curing of the hay in first-class condition.

On October 14 a heavy rain- and snow-storm set in which lasted for several days. The snow did not disappear entirely nor the frost again leave the ground. Probably 5 per cent of the potatoes and roots in this district were frozen in, and the early closing of the soil by frost prevented further fall ploughing. Temperatures during the winter have been low, with much wind, which drifted the snow to a more than usual degree.

METEOROLOGICAL RECORDS.

Month.	Maximum.	Date.	Minimum.	Date.	Precipitation	Sunshine.
	Deg. F.		Deg. F.		Inches.	Hours.
1916.						
April	58·8	11	4·9	2	1·24	150·8
May	75·8	11	12·9	4	3·262	208·3
June	83·3	16	27·9	3	1·49	255·8
July	85·8	18	29·9	30	1·13	348·7
August	85·8	16	30·9	8	1·885	254·4
September	82·2	21	23·9	29	2·043	175·3
October	72·8	5	8·4	22	1·363	123·6
November	69·6	19	11·4	26	.....	162·9
December	47·8	31	−42·1	12	1·3	53·8
1918.						
January	47·0	21	−44·0	30	0·53	57·0
February	47·8	22	−41·6	20	0·06	119·7
March	63·8	30	−35·6	5	0·3	191·6
					14·603	2,101·9

LIVE STOCK.

Horses.—The horses at Lacombe Station number twenty-seven head, and include registered representatives of the Clydesdale, Percheron, and Hackney breeds. Work teams, temporarily idle in winter, have again been wintered in the open; young horses which went out in thrifty condition have been well maintained on oat straw and one bundle of green-feed daily.

Dairy Cattle.—There are now twenty-five pure-bred Holstein cattle in the dairy herd. The manufacture of Cheddar cheese from the entire output of milk has been continued throughout the year. This product has been practically all marketed locally at 25 cents per pound wholesale. The average return per cow for the year has been $196.44.

Beef Cattle.—This Station owns twenty-nine registered Aberdeen Angus cattle. The natural increase of the herd finds ready sale at profitable prices. In addition to the registered stock, forty-two grade cattle are on hand on March 31.

Sheep.—Twenty-six lambs were raised from twenty-seven common grade ewes in 1917. These lambs were sired by a registered Shropshire ram, and as a result of the infusion of this strain of blood showed increase in live weight and in length of staple as well. The sale of wool from the flock which was purchased in 1914 brought practically twice as much as the cost price of the foundation flock. Over four hundred range ewes were purchased in 1917 and divided into six flocks, with the object of testing the relative merits of different pure breeds of sheep for grading up the average range flock. Shropshire, Oxford, Hampshire, Leicester, Cheviot, and Corriedale sires are in use. The Corriedale ram purchased was first prize ram at Rangiora, New Zealand, this season, while the other sires are representative individuals of the respective breeds.

Swine.—Experiments have been conducted to determine both the stock-carrying capacity of various pastures for hogs, and the pounds of grain required for a pound of pork gain with different pastures. The results indicate the best commercial pastures to be alfalfa and rape, the former for use early in the season, and the latter for late summer and fall. Of those tested, the best single pasture was rape. It required 4·34 pounds of grain to make 1 pound of pork on the self-feeder with rape pasture. It required 6·16 pounds of grain to make a pound of pork on the self-feeder, without pasture of any kind. An acre of rape pasture effected an economy of 2,453 pounds of grain, which would have, at present prices, a cash value of about seventy-five dollars. Hogs fed through the self-feeder not only produced a pound of pork for less grain, but weighed one hundred and ninety-nine pounds at the same time that those fed a 3-per cent ration by hand weighed one hundred and eighteen pounds. The self-feeder, therefore, effected an economy of time, labour, and feed. An experiment to determine the economy of various breeds for the production of pork was continued during the past year, but a further season's work must be carried on before the final results are available. Six hundred and seventy-five hogs were used in 1917 in securing information along all these lines. This does not include the breeding stock maintained at this Station, which numbered eighty head at the close of the fiscal year.

POULTRY.

The stock of poultry at Lacombe consists of sixty-one hens, one hundred and seventy-nine pullets, twenty-seven cocks, and three capons, of the Barred Rock, White Wyandotte and Single Combed Rhode Island Red breeds; also eight geese. Trap-nesting of different pens of pullets has been carried on during the winter, and the records secured indicate the value of this system of selecting the best laying foundation stock.

BEES.

During the winter of 1916-17 two colonies of bees died, due to the candying of the stores. The remaining four colonies came through in excellent condition, and produced a surplus of two hundred pounds of extracted honey. That one colony produced one hundred and thirteen pounds of honey is evidence of the possibilities of bee-keeping in this locality.

FIELD HUSBANDRY.

Rotations.—The main rotation of the farm, including some 215·6 acres, is as follows:—

Hay, manured in winter, 12 tons to the acre.
Pasture, ploughed in July or August 6 inches deep and fall worked.
Wheat (or oats).
Oats.
Barley, and seed down with timothy and alsike clover.

The possibilities of this rotation in its relation to the cleaning of the land are more apparent each year. The percentage of weed seeds in the grain crop is decidedly less than at the beginning, and this result has been secured without the loss of a single year's crop. An encouraging feature in connection with the various rotations is the success with which clover is being grown.

Cultural Experiments.—A single ploughing for summer-fallow early in the season gave better results than double-ploughing early and backsetting later. Ploughing 6 to 8 inches deep gave the maximum yields. Summer-fallow ploughed in May or June gave decidedly better yields than when the land was left untouched until July. The practice of seeding grass and clover with a nurse crop is again to be recommended for this district, especially when the land has been summer-fallowed or has grown a hoed crop the previous year.

The application of manure to land for the production of roots and grain has again proved valuable. An increase of 1 ton per acre of roots, 5 bushels per acre of wheat, 6 bushels and 30 pounds of barley per acre and 10 bushels and 8 pounds per acre of oats resulted from the application of twelve tons of barnyard manure per acre.

CEREALS.

Eighteen varieties of spring wheat were sown in duplicate plots at the rate of 3 bushels per acre. The highest yield among the named varieties in 1917 was secured from the "Bishop" variety, which yielded at the rate of 56 bushels 40 pounds per acre. Thirteen varieties of oats were grown, the highest yield being 138 bushels per acre secured from the Danish Island variety. Of the eighteen varieties of barley grown, the "Barks" gave the largest yield, viz., 84 bushels per acre. A number of the new selections of grains stand well up in the list, and give promise of being of distinct value for this section of the West. The new wheat, Ruby (Ottawa 623) gave a yield of 42 bushels per acre under field conditions.

FORAGE PLANTS.

Indian Corn.—On account of the cold temperatures during the early months of the growing season, the varieties of corn under test failed to make sufficient growth to warrant the taking of records.

Roots.—Turnips were seeded on Rotations "K" and "O", and gave a yield of 13 tons per acre. Assuming the feeding value of $3 per ton as being the limit in value of roots of this class for cattle, it would appear unwise to encourage extension of the areas devoted to this particular crop while labour is as high-priced and as difficult to secure as at the present time.

Grasses and Clovers.—For pasture purposes the seeding of alfalfa in drills is distinctly superior to the broadcast method, while the yields of hay secured have been but slightly less under this system. A consideration of importance is the first cost of getting the crop established, since the drill system effects a saving of at least eight pounds of seed per acre. Fifty-six plots of one-fortieth of an acre were sown to various mixtures of grasses and clovers with the object of making comparisons between the different varieties singly and as mixtures, both for hay and pasture purposes.

HORTICULTURE.

Fruits.—Crab-apples have been ripened at this Station during the past year, which completes a cycle of five years during which fruit has been successfully matured. Such standard apple trees as Charlemoff, Hibernal, Antonovka, and Blushed Calville give promise of fruiting when they have attained sufficient size. Large yields of fruit of good quality were secured from the new currant plantation; the largest crop of gooseberries yet ripened was harvested, while the yield of raspberries was also the heaviest on record. The yield and quality of the strawberries were good, the Senator Dunlap giving the most satisfactory return.

Vegetables.—The usual vegetables were successfully grown, both variety and cultural tests being carried on on a somewhat large scale. The cost of growing an acre of potatoes was carefully kept, as well as extensive tests carried on as to distances apart in planting, depths and frequency of cultivation.

Trees and Shrubs.—A splendid showing was made by the following shrubs: *Cotoneaster nigra, Syringa villosa, Lonicera grandiflora rosea, Lonicera Tartarica, Spirea Van Houttei, Spirea sorbifolia and Caragana arborescens.* The hedges making the best showing are laurel willow, caragana, and white spruce.

BUILDINGS.

A new silo, sixteen by thirty-six, was erected, which addition to the silo space now provides a total capacity of about two hundred and fifty tons.

EXHIBITIONS.

An educational exhibit was shown by this Station at sixteen points throughout the province last year, and was visited by approximately 25,500 people. The mailing list was signed by 994 persons, and 13,700 bulletins were distributed.

MEETINGS.

The Superintendent addressed meetings during the year at Edmonton, Camrose, Rimbey, Olds, Calgary, Edmonton (University), Ottawa, Regina, Saskatoon (Dairy Convention), Edmonton, Sylvan Lake, Castor, Bowden, Vermilion, Vulcan, and Lakeside. He acted as judge of swine at Calgary Exhibition, and of sheep and swine at Red Deer, and at the Provincial Seed Fair for Saskatchewan, at Saskatoon. Mr. B. C. Milne, Assistant to the Superintendent, addressed meetings at Sulphur Springs, Eye Hill, and Provost.

EXPERIMENTAL STATION, SUMMERLAND, B.C.

REPORT OF THE SUPERINTENDENT, R. H. HELMER.

THE SEASON.

The precipitation during the growing season was unusually low, and although the winter of 1916-17 was very severe, very little snow fell in the hills. Only 5·97 inches of rain fell from early spring to late fall. May and June were the wettest months. Only one day's rain helped to any extent, on May 24, when 0·80 inch fell in the twenty-four hours. This rain did much to save the Okanagan from a crop failure, as it filled the reservoirs which the melting snow had failed to do. The light snowfall reduced the amount of water very materially, and crops generally suffered from this shortage. July was the hottest month, with an average of 85·12° maximum, 56·32° minimum, hottest day 98·00° in the shade, and 370 hours sunshine. The winter of 1917-18 has been very mild, the lowest temperature being 2 degrees below zero on January 31. There is an abundance of snow in the hills, which means full ditches this year.

METEOROLOGICAL RECORDS.

Month.	Temperatures.			Rainfall.	Snowfall.	Sunshine.
	Maximum.	Minimum.	Mean.			
	Deg. F.	Deg. F.	Deg. F.	In.	In.	Hours.
1917.						
April	62·00	21·00	44·68	0·98	.....	128·9
May	76·00	33·00	54·85	1·84	.....	196·2
June	88·00	42·00	59·63	1·25	.....	205·7
July	98·00	46·00	70·72	0·33	.....	370·1
August	96·00	50·00	69·75	0·18	.....	326·9
September	82·00	41·00	59·73	0·89	.....	187·1
October	81·00	27·00	50·02	0·08	.....	170·8
November	52·00	26·00	41·26	0·10	.....	41·8
December	53·00	2·00	28·95	.....	32·25	20·6
1918.						
January	44·00	−2·00	29·47	0·02	10·8	53·2
February	48·00	4·00	27·87	0·01	4·5	85·3
March	64·00	11·00	38·74	0·16	1·4	118·9
Totals				5·74	48·95	1,905·5

LIVE STOCK.

Horses.—There are seven horses on this Station, three teams and one driver. All are in good condition, and have worked practically every day, winter and summer.

Cattle.—Fifty-nine head of cattle were purchased for feeding purposes in the fall. The older steers have made good beef, and the younger ones have grown well and made good gains.

Sheep.—In November ten ewes and one ram, pure-bred Cheviots, were purchased, and also twelve grade Oxford-Shropshire ewes. A ewe lamb born January 24 has grown very well indeed; other lambs were born during March.

Swine.—Three Berkshire sows and one boar were bought this spring. Two of the sows have farrowed, and one had just weaned a litter before purchase.

POULTRY.

Fifty White Wyandotte pullets were purchased in December, and have laid well all the winter. Six White Wyandotte cockerels were received from the Sidney Experimental Station, and five turkey hens and one tom were sent from the Invermere Experimental Station.

BEES.

Of the three colonies of bees that were wintered in an outdoor wintering case, only one came out alive in the spring of 1917. Two more colonies were purchased locally, and these did fairly well. Two swarms were cast, and five colonies, four strong and one rather weak, were put away for the winter. A casual glance was taken at them during March, and apparently four are in good condition.

FIELD HUSBANDRY.

The first cutting of hay crops such as alfalfa, clover, and timothy, yielded heavy crops of excellent quality. The second crop of clover was light owing to water shortage, second crop of alfalfa was fair, and the third crop was practically nothing. The alfalfa ground was badly burnt up, but seems to be sprouting well this spring. Oats and barley were very disappointing crops. The prospects for both were excellent, but the hot spell in July, with the shortage of water, reduced yields very much. In some cases the crop was not worth threshing. In this respect it was found that two-row barley filled the best.

CEREALS.

Rotation.—A five-year rotation is used in the variety tests for cereals and peas and flax. Wheat, oats, and barley are in quadruplicate plots, and peas and flax in sextuplicate. It is hoped to increase the varieties under test this year. The corn variety plots will appear in the hoed crop year of the cereal work.

Red Fife wheat gave highest yield with 50 bushels per acre, Marquis was second with 49 bushels, O.A.C. barley yielded 63.75 bushels per acre, Daubeney oats yielded 88 bushels. This year's cereal plots will come on land that was well manured during the winter of 1916-17 and planted to beans last year.

On the dry farm very fair yields of grain were obtained, considering the dry season.

FORAGE PLANTS.

The growing of forage plants is one of the most important phases of work on this Station. The duplicate plot system is being used on a four-year rotation.

Indian Corn.—Thirteen varieties were tested, and Reid's Yellow Dent gave the highest yield. All corn was fully ripe when harvested.

Roots.—Fifteen varieties of mangels were grown, and the suitability of the Intermediate type for bench land was well demonstrated. Ten varieties of carrots were grown, and here also the Intermediates showed superiority over the other types. Twenty-three varieties of swede turnips yielded very low, as also did six varieties of fall turnips. Lack of water enfeebled the plants and allowed aphis to check the growth still further. Plots of Swiss chard, rape, thousand-headed kale, kohl rabi, and sugar beets gave good returns. Alfalfa and timothy and clover, which are the principal hay crops, gave good yields of first-class hay, the first cuttings; second crops suffered from water shortage, and the third crop of alfalfa was very poor. Three and a half acres of Mammoth White Intermediate, and half an acre of White Belgian carrot stecklings were grown. The seed was sown on July 14, and produced excellent stecklings by October 30. Bruce's Mammoth White Feeding sugar beet, sown on August 4, produced good stecklings by October 30, when all were dug and pitted. These came through the winter in good condition. A few rows of carrots were ridged with a small plough and covered with potato tops and pine needles and have come through the winter well. It is doubtful, however, whether this could be done every winter.

HORTICULTURE.

Fruits.—The apple trees have made good growth, and are healthy and vigorous. The orchard under clean cultivation has, on the whole, made the largest growth; the orchard under soiling crops has much improved, and the one under clover also. In the orchard in which truck crops are being grown, a good crop of potatoes was harvested. The orchard under a farm rotation, which is on the poorest soil, has improved. The alfalfa orchard has made least progress. The pears have not grown as well as they should have done; peaches, plums, apricots and cherries have done well. Small fruits such as black, white, and red currants gave fair yields.

Vegetables.—Hot weather vegetables, such as egg plants, peppers, tomatoes, and cucumbers, were of good quality this year. Cabbages and cauliflowers suffered from the heat and dry weather. Good yields of peas were obtained.

Ornamental Gardening.—The grounds were very much improved by the lawns that were started this year. The bulbs were very fine, and the flower garden attracted many visitors to the farm.

FERTILIZER EXPERIMENTS.

A three-year experiment with commercial fertilizer alone and in combination with barnyard manure was started this year, with potatoes as the first crop, followed by oats seeded with clover, and then clover hay. The plots gave very varied results. Those to which barnyard manure alone had been applied at the rate of 20, 15, and 10 tons per acre showed good colour early in the season and heavy tops, but owing to water shortage the crop was disappointing.

BUILDINGS.

An implement shed, 16 feet by 60 feet, was erected near the cattle pens and a sheep shed, 16 feet by 50 feet, was built during the winter. An office, 25 feet by 40 feet, was also put up. This is a two-storied building with full basement. The top story is one big room. The first floor consists of one main office, one small office, and one workroom. It is steel-lathed and plastered on the outside, and is a big improvement on the old office. Two permanent poultry houses, 16 feet by 32 feet, and a poultry administration building have been erected. A cement distributing box and settling tank was put in at the outlet of the steel irrigation water pipe. This will save a lot of trouble from flumes blocking up, which gave considerable trouble last year; among the varied collection of things coming through were little chickens and pigs, hens, snakes, and fish. All these will now be taken care of before they can reach the flume. A temporary cook-house and a bunk-house are in course of construction.

EXHIBITIONS AND MEETINGS ATTENDED.

This Station had an exhibit at the following shows: Kelowna, Armstrong, Kamloops, and Summerland. The new background for the exhibit was favourably commented on by all. The Superintendent visited Sorento in May at the request of the fruit growers of that section in connection with winter injury to trees, and in September visited this section again on the way to Kamloops exhibition. He also attended Women's and Farmer's Institute meetings at Naramata, Summerland, and Armstrong, the Seed Fair at Armstrong, the convention of the British Columbia Stockbreeders' Association, a meeting of the British Columbia Seedgrowers' Association, and the annual meeting of the United Farmers of British Columbia at Victoria.

VISITORS.

It is pleasing to note that visitors are becoming more numerous. The Naramata Farmers' Institute spent a day at the Station and also the Kelowna Farmers' Institute; the Summerland Women's Institute gave a picnic on the Station to the Women's Institutes from Peachland, Naramata, and Penticton. The school children visited the Station in connection with potato competitions.

EXPERIMENTAL STATION, INVERMERE, B.C.

REPORT OF THE SUPERINTENDENT, G. E. PARHAM.

THE SEASON.

The spring of 1917 was very backward, and ploughing was not possible before April 15. On twenty-four days during that month night frosts of varying intensity were recorded, and the mean temperature was only 37·93°. It was observed that the ice did not finally leave lake Windermere until May 3.

Spring seeding was commenced the first week in May, and the genial weather during that month, with a record of 227 hours of sunshine and 2·87 inches of rain, retrieved the situation to some extent, and plant growth was materially advanced. A dry season followed, total precipitation for the three months ending August 31 amounting to 3·45 inches, with a daily average of 9·7 hours of sunshine: the sunshine readings for June totalled no less than 365 hours, showing a daily average of 12·2 hours. In consequence of the drought, the dry-farming plots at the Station were almost a complete failure, but some excellent crops were harvested from the irrigated sections; hay and grain crops matured rapidly, and were harvested under ideal conditions.

The winter season was remarkable for the unusually heavy snowfall, amounting to 39·65 inches, being 3 inches in excess of the combined totals of the two preceding years. Some Chinook winds, in previous years, have swept bare the exposed portions of the Station, causing winter-killing of the clover and other plants, but this year, the land has maintained a good covering of snow throughout the entire season.

LIVE STOCK.

Dairy Cattle.—The herd consists of three Shorthorn cows, purchased in 1916, together with their progeny—two heifers and a steer—and a registered Shorthorn bull procured from the Experimental Farm at Indian Head, which will be used for the benefit of local breeders as well as for service at the Station.

Hogs.—While hog raising has not been commenced at the Station, the need in the district of a reliable boar was expressed at the general meeting of the Agricultural Association, and in response to their appeal to the Director, a Berkshire boar has been sent in from the Lacombe Station, which is being made use of by farmers in the neighbourhood.

POULTRY.

The stock consists of Barred Rocks, White Leghorns, and Light Sussex Egg-laying records of one pen in each breed were kept by means of trap-nests, the highest individual records in the three breeds being 208, 193, and 151, respectively. The pen showing the best record was one of 25 Barred Rocks, the total number of eggs laid being 3,862—an average of 154·5 per bird. Feeding statistics show that the amount of food consumed during the twelve months averaged 96 pounds, at a cost of $2 69 per bird: the average cost (for food) of a dozen eggs, during the year, was 20·8 cents. A considerable saving of labour has resulted from the adoption of hopper-feeding, and in the use of snow in place of water during the winter months. Further experiments were conducted in crate fattening, and some excellent results were obtained. All cockerels not held for breeding purposes were sold locally, the demand being keen at 25 cents per pound, live weight.

Turkeys.—A flock of American Bronze turkeys was raised, some being hatched out under fowls, and others by artificial incubation. The young birds are accomodated in an open house, with wire netting on three sides, while the stock birds are kept,

throughout the year, in a wire enclosure, with the native firs as their only shelter. Except for the ravages of owls and coyotes, which accounted for several losses, there was no mortality among the latter, and they have come through the winter in fine condition. Feeding experiments were conducted, thirty-eight male birds being fattened for the Christmas market, and they found a ready sale at 30 cents to 35 cents (dressed) per pound, according to weight.

APIARY.

The season's work commenced with twelve colonies, of which six had been wintered in a cellar, two in the open, protected by double packing cases lined with moss, and four in a trench, dug into a dry, sandy knoll, and covered with 6 inches of straw and 9 inches of earth.

Though all the colonies came through the winter in good shape, those buried in the trench wintered best, and when taken out in the spring were found to be practically as strong as when put in.

The honey yield during the 1917 season was, in common with that of the whole province, below the average, amounting to 975 pounds.

The average per colony was 81¼ pounds, the highest from any one colony being 120 pounds. One hive was placed upon scales, and a daily record kept of its gain or loss in weight.

FIELD HUSBANDRY.

Rotations.—Experiments were continued in the 3-, 4-, 5-, and 6-year rotations, and, for purposes of comparison with these methods, one plot on the irrigated section has been seeded to oats continuously, without manure or fertilizers, and another plot with oats and summer-fallow alternately. With the 4-year rotation a record is kept of the amount of water used for irrigation, together with the amount per acre on each half-acre plot. The following table gives the figures for the four years:—

	Plot I.		Plot II.		Plot III.		Plot IV.	
	Crop.	Acre-inches. per acre.	Crop.	Acre-inches per acre.	Crop.	Acre-inches per acre.	Crop.	Acre-inches per acre.
1914	Roots	12·78	Oats	5·89	Peas	11·40	Oats	9·27
1915	Wheat	5·04	Roots	2·03	Oats	6·73	Peas	5.84
1916	Peas	3·52	Wheat	....	Roots	1.52	Oats	....
1917	Oats	4·14	Peas	9·69	Wheat	7·55	Roots	5·75

Much of the clover in the rotation plots was winter-killed and the plots were either re-seeded in the spring, or sown to peas for hay.

FORAGE CROPS.

Seed Production.—Experiments in seed production were inaugurated in the season under review. The plants selected were alfalfa, meadow fescue, sainfoin, Western rye, red clover, orchard grass and alsike. Plots measuring one-thirtieth of an acre each were sown broadcast, and a further series of plots was sown in drills. Of these, the only plants that produced any yield in this, the first year of the test, were meadow fescue and Western rye. The fescue when threshed yielded at the rate of 121 pounds per acre from the broadcast plot, and at the rate of 150 pounds per acre from the plot sown in drills. The western rye yielded at the rate of 412½ pounds and 337½ pounds respectively. Experiments were also inaugurated in the production of hay from mixtures of clover and various grasses, and from mixtures of alfalfa and various grasses; a good stand was obtained in all the plots.

Soiling Crops and Annual Hay Crops.—Test plots were started to determine the most suitable crops for soiling purposes and for annual hay production. The plots selected had been in clover sod for three years, and were treated with a heavy dressing of barnyard manure prior to seeding on June 22. The following yields per acre were produced:—

Soiling Crops: Broad-leaved Essex rape, 42 tons; Dwarf Essex rape, 40¼ tons; Thousand-headed kale, 32¾ tons; Swiss chard, 341½ tons.

Annual Hay: (All cut green) Sudan grass, 6¾ tons Hog millet, 13½ tons; Siberian millet, 12½ tons; Japanese millet, 12½ tons; peas and oats, 12½ tons; vetches, 28¼ tons. The Sudan grass and Japanese millet were injured by frost.

Roots.—Variety tests were carried out with mangels and turnips. The former were entirely destroyed by the cutworm, while, of the latter, the heaviest yielders among the twenty-eight varieties sown proved to be White Globe and Mammoth Greystone.

Corn.—Nine varieties of field corn were planted on the 23rd May, but though the plots yielded well as fodder, no cobs matured; the best yields were from Gehu, Reid's Yellow Dent, and King Philip.

CEREALS.

Variety tests were made with wheat, barley and oats, with the following results:—

———	No. of days maturing.	Yield of grain per acre.		Weight of measured bushel, after cleaning.
		Bush.	Lb.	Lb.
Wheat—				
Huron	135	27	40	63
Marquis	136	24	20	62
Pioneer	136	23	20	59
Barley—				
Manchurian	92	18	00	42
Success	86	15	40	47
Chevalier	119	23	36	51
Gold	119	45	20	56
Oats—				
Banner	125	30	40	44
Daubeney	121	24	28	42
Victory	125	36	32	43

The above plots measured one-twentieth acre, and were sown during the first week in May, with the exception of the Manchurian and Success barleys, which, owing to poor germination, were cultivated out and resown on June 12.

Field Peas.—Five one-twentieth-acre plots of peas were sown on the 4th and 5th of May, as a variety test, and the following yields were obtained:—

———	No. of days maturing.	Yield of grain per acre.		Weight of measured bushel, after cleaning.
		Bush.	Lb.	Lb.
Arthur	139	44	40	63
Chancellor	133	45	66	66
Golden Vine	133	48	00	65
Prussian Blue	139	55	40	67
Solo	133	47	40	63

FIBRE PRODUCTION.

A commencement was made in growing hemp and flax for fibre production: four one-tenth-acre plots were sown, and the produce of one plot was forwarded to the Central Farm for further treatment.

HORTICULTURE.

Vegetables.—Tests of varieties and of cultural methods were carried out as in previous years, and some good crops of potatoes and garden vegetables grown, though, through the depredations of the onion maggot, the onion crop was again a failure. Satisfactory results were obtained in forcing seakale and rhubarb in the cellar, for winter use, and a number of inquiries have been received, and parties furnished with information as to the methods used in this work.

Fruits.—After experiments extending over three years with a number of well-known varieties of apple, the fact seems established beyond doubt, that only the crabs and some of the hardiest of the Russian varieties show any promise of being able to stand the severe winter conditions at this Station; on the other hand, it has been observed that orchards in the district, situated in sheltered localities, and on northerly slopes, have suffered much less from winter-killing, and in some cases promise well. Some good crops of bush fruits were gathered, and some interesting results obtained in the testing of different varieties, and of various methods of pruning.

NEW LAND.

Thirty acres of the adjacent bench land, recently acquired for this Station, were partly cleared, and approximately 10 acres were broken and seeded; the land produced a useful crop of oats, a part of which was fed green to the cattle, while the balance was cut for hay.

EXHIBITIONS.

The following fall fairs were attended: Invermere, Cranbrook, Nelson, Grand Forks, Needles, and Nakusp. Considerable interest was evinced, at all points visited, in the Farm exhibit, the fine appearance of the new background and fixtures being invariably commented upon.

The exhibit has been the means of bringing a large number of farmers into personal touch with the Station, as well as with the work of the Experimental Farms generally.

A quantity of literature was distributed at the fairs, while requests for special information on a variety of subjects have been dealt with from this Station.

EXTREMES OF TEMPERATURE.

Month.	1914.				1915.				1916.				1917.			
	Max.		Min.		Max.		Min.		Max.		Min.		Max.		Min.	
	Date	°	Date	°	Date	°	Date	°	Date	°	Date	°	Date	°	Date	°
April	30	71	1	22	16	75	21	24	26	76	23	21	14	54	1	11
May	16	87	6	28	7	78	29	30	4	71	11	26	12	77	1	22
June	18	85	6	34	24	82	8	35	18	88	7	34	16	86	13	35
July	31	95	16	42	20	83	5	40	31	88	23	39	17	94	31	36
August	1	95	31	33	6	89	5	44	27	84	4	37	16	88	31	37
September	2	80	30	33	5	80	20	27	1	77	28	24	21	80	31	27
October	16	66	22	24	23	65	7	23	16	67	4	20	3	73	28	9
November	25	51	15	3	1	49	13	– 4	1	47	12	–12	4	50	1	16
December	2	35	15	–16	4	40	30	–16	2	39	27	–31	18	44	25	15
		1915.				1916.				1917.				1918.		
January	11	36	21	–15	23	40	12	–34	9	40	31	–25	3	–40	31	–32
February	17	44	14	– 1	15	48	3	–25	12	44	1	–26	7	46	1	–27
March	21	63	8	12	11	58	5	1	5	42	1	– 8	29	62	6	– 5

MEAN TEMPERATURES DURING SAME PERIOD.

Month.	1914.			1915.		
	Mean Max.	Mean Min.	True Mean.	Mean Max.	Mean Min.	True Mean.
	°	°	°	°	°	°
April	55·46	32·23	43·84	61·83	32·20	47·01
May	65·83	38·13	51·98	63·31	40·83	52·07
June	68·33	45·50	56·91	68·43	44·00	56·21
July	81·29	47·67	64·48	71·83	48·77	60·30
August	78·32	43·12	60·72	81·90	48·25	65·07
September	61·86	37·70	49·78	62·63	36·40	49·51
October	49·87	33·67	41·77	53·83	34·00	43·91
November	37·50	23·86	30·68	32·00	16·66	24·33
December	19·74	3·67	11·70	29·58	12·67	21·12
		1915.			1916.	
January	22·45	3·80	13·12	4·83	−14·41	− 4·79
February	36·00	14·56	25·73	28·40	6·60	17·50
March	42·67	23·58	33·12	42·90	22·90	32·90
		1916.			1917.	
April	55·10	29·50	42·30	49·06	26·80	37·93
May	57·90	35·20	46·55	63·50	37·00	50·25
June	68·60	43·30	55·95	66·60	41·00	53·80
July	81·29	47·67	64·48	81·50	47·40	64·40
August	75·00	43·90	59·45	76·40	44·30	60·30
September	63·76	35·56	49·66	65·03	38·23	51·63
October	50·50	27·90	39·20	53·20	27·80	40·50
November	31·70	12·40	22·05	36·70	27·30	32·05
December	14·00	−3·90	5·05	23·50	7·50	15·50
		1917.			1918.	
January	21·80	2·90	12·35	22·80	6·70	14·70
February	25·60	3·00	14·30	23·90	3·14	13·52
March	35·70	9·10	22·40	42·00	19·00	30·50

SUNSHINE RECORDS.—MONTHLY TOTALS AND RATIO TO POSSIBLE HOURS.

Month.	1914.			1915.		1916.		1917.	
	Possible.	Total hours.	Ratio.	Total hours.	Ratio.	Total hours.	Ratio.	Total hours.	Ratio.
April	414·2	165·1	0·40	208·7	0·47	182·5	0·44	168·9	0·40
May	480·8	237·1	0·47	168·0	0·32	179·1	0·37	227·0	0·47
June	494·1	198·4	0·40	197·7	0·40	202·0	0·40	230·2	0·46
July	497·9	314·5	0·63	211·4	0·42	271·1	0·54	365·1	0·73
August	450·7	267·9	0·59	269·9	0·65	269·0	0·60	300·4	0·66
September	379·0	148·3	0·39	151·8	0·40	192·2	0·51	142·9	0·38
October	329·6	86·7	0·26	124·7	0·37	159·2	0·48	147·2	0·44
November	266·1	56·4	0·21	59·0	0·22	84·6	0·31	23·7	0·09
December	242·3	86·8	0·36	43·4	0·17	84·4	0·34	38·2	0·15
		1915.		1916.		1917.		1918.	
January	259·2	46·0	0·18	99·0	0·38	80·1	0·30	44·1	0·17
February	276·6	70·9	0·25	97·8	0·31	99·8	0·36	80·9	0·29
March	366·6	175·8	0·47	131·7	0·35	143·7	0·40	141·7	0·39
Totals	4,457·1	1,853·9	0·42	1,763·1	0·40	1,947·7	0·44	1,910·3	0·43

RAIN AND SNOWFALL RECORDS.

Month.	1914.			1915.			1916.			1917.		
	Rain.	Snow.	Total	Rain.	Snow.	Total.	Rain.	Snow.	Total.	Rain.	Snow.	Total.
April	1·25	.....	1·25	1·14	.....	1·14	0·62	.....	0·62	0·18	0·5	0·23
May	1·46	.....	1·46	1·01	.....	1·01	2·89	.....	2·89	2·85	.....	2·85
June	1·59	.....	1·59	3·92	.....	3·92	2·01	.....	2·01	1·96	.....	1·96
July	1·57	.....	1·57	3·79	.....	3·79	2·32	.....	2·32	0·29	.....	0·29
August	0·75	.....	0·75	0·67	.....	0·67	2·01	.....	2·01	1·20	.....	1·20
September	2·16	.....	2·16	0·72	.....	0·72	1·15	.....	1·15	0·75	.....	0·75
October	0·77	.....	0·77	0·90	.....	0·90	0·54	.....	0·54	0·19	2·2	0·41
November	0·39	4·00	0·79	0·10	8·0	0·90	0·08	2·5	0·33	0·38	.....	0·38
December	.....	4·25	0·42	0·28	3·0	0·58	.....	3·0	0·30	0·17	24·2	2·59
		1915.			1916.			1917.			1918.	
January	0·00	5·12	0·51	0·01	4·3	0·44	.....	1·5	0·15	1·96	.....	1·96
February	.....	3·00	0·30	0·21	10·1	1·22	.....	3·6	0·36	0·06	11·62	1·22
March	0·03	.....	0·03	0·33	1·2	0·45	.....	1·8	0·18	0·24	1·1	0·35
Totals	9·97	16·37	11·60	13·08	26·6	15·74	11·62	12·4	12·86	10·23	39·6	14·19

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE OFFICER-IN-CHARGE, W. H. HICKS, B.S.A.

THE SEASON.

The spring of 1917, like to its predecessor, opened very late. The heavy precipitation of 9·84 inches in April practically prohibited seeding until the latter part of the month. The exceptionally dry, bright May was just what was needed to get the crops sown in good condition, and made up in many respects for the wet month preceding. June was fairly wet, with the rain well distributed; July and August were dry and hot; September was cooler with more rain, while October was the driest since 1911; 8·7 inches of rain fell in November and December was the wettest month of the year. Although the growing season was dry, the winter months were so exceptionally wet that the total precipitation amounted to 79·27 inches for the year, which is the greatest recorded since 1913.

The late spring and dry summer were not conducive to the best root and pasture crops. The grain and hay yields were fair, the latter being of excellent quality. The corn crop was one of the best ever grown on the Farm.

METEOROLOGICAL RECORDS.

Month.	Maximum Temperature.		Minimum Temperature.		Mean.	Precipitation.			Sunshine. Hours.
	Date.	Degree.	Date.	Degree.		Rain.	Snow.	Total.	
April	28	67	2	30	44·51	9·84	.....	9·84	75·3
May	8	78	18	35	53·52	2·22	.....	2·22	138·7
June	27	82	11	42	56·23	4·3	.....	4·3	127·3
July	14	87	23	38	62·75	0·59	.....	0·59	267·5
August	16	89	25	43	64·88	1·1	.....	1·1	278·8
September	4	83	25	34	58·49	3·44	.....	3·44	128·7
October	7	74	27	31	48·59	6·84	.....	6·84	100·8
November	13	61	26	30	45·06	8·71	.....	8·71	53·8
December	18	59	27	15	35·73	11·59	32·0	14·79	15·7
1918.									
January	23	51	30	15	37·25	9·16	6·0	9·76	23·6
February	8	51	18	19	36·49	5·37	16·5	7·02	75·4
March	29	60	5	20	40·37	9·16	15·0	10·66	79·5
						72·32	69·5	79·27	1,365·1

LIVE STOCK.

Horses.—Eleven horses are kept on the Agassiz Farm for working purposes. The average feed cost per hour's work done by the heavy draught horses from April 1 to November 1 amounted to 5·52 cents and for the light draught horses 5·55 cents. Three of the latter were wintered in an open shed on a daily feed ration costing 22 cents. They came through the winter in good condition for work in the spring. A start was made in horse breeding by the purchase, in October, of the pure-bred Clydesdale mare Melita Imp. (28941). This is a massive mare with fair quality and is in foal to Bowhill Baron (9492).

Cattle.—The herd of dairy cattle now comprises eighty head, thirty of which are pure-bred and fifty grade Holsteins. Of the twenty-nine cows which have finished a lactation period during the year, 44·9 per cent have given heifer calves. The average milk production per cow for the entire herd is 8,372·4, the duration of the lactation averaging 337 days. The cow Aurora Mechthilde (9701), tested under Record of Performance rules, produced 18,195 pounds of 3·48 milk in 350 days. The general health of the herd has been excellent. The tuberculin test was again applied and no disease discovered. Another year's feeding demonstrates the suitability of pea and oats or clover silage as a substitute for corn. The cost of raising heifers has increased, due to the high values placed upon all concentrates.

The Empire mechanical milker installed in 1916 continues to give good satisfaction.

During the year, over five thousand cream cheeses have been manufactured, and found a ready market in the city of Vancouver. A limited number of Camembert, Pont l'Eveque, and Stilton cheeses have also been disposed of. Milk testing work for the year has consisted of the regular weekly test of each cow in the herd, Record of Merit work, and samples sent in by farmers in the province.

Sheep.—The flock at the Agassiz Farm now numbers 75 sheep and 53 spring lambs, 55·5 per cent of them being pure-bred Horned Dorsets. The average feed cost per sheep for wintering the flock amounted to $3.19. The 1918 lamb crop at date of writing is very satisfactory but a few of the ewes are late. Eight lambs, born in October and November, were weaned on February 1 and fed for the market. In forty-seven days they gained 170 pounds, and sold at Easter for $11 each. The sheep-grading experiment with the Dorset rams and dark-faced, hornless, grade ewes is showing good

results. A great many of the second cross animals are of fine Dorset type. Not only is the Dorset showing in the horns and white faces, but in wool and conformation as well.

Swine.—The swine kept on the Agassiz Farm are of the Yorkshire breed, and number forty-nine head. Nine mature sows were maintained throughout the year, at an average cost of $43.61, including the cost of raising their young pigs to weaning age. These sows farrowed seventeen litters and raised 7·82 pigs per litter, or an average of 14·8 pigs per sow during the year. The breeding stock is housed in portable cabins on unproductive land. At farrowing time the sows are placed in the piggery, where special attention is given to the young litters for a couple of weeks. There have been sold during the year for breeding purposes 21 males and 23 females. With the aid of a self-feeder and pasture the feed cost to produce pork was $8.12 per hundred and by the trough-feeding method $8.30. In one trial $13.70 per ton was realized for unmarketable potatoes when boiled and fed to fattening hogs.

POULTRY.

The stock kept consists of Barred Plymouth Rocks, Single Comb White Leghorns and Homer pigeons. The latter are unprofitable, as the demand for this class of poultry is very limited. Approximately 500 birds, exclusive of pigeons, were carried over the winter. From October 1, 1917, to April 1, 1918, the feed cost per bird was $1.20, and the profit above the feed cost was $1.11.

From a total of 4,700 eggs set, 1,986 chicks were hatched, or 42·3 per cent. The percentage of chicks raised from those hatched was 63·8 at a cost, at three and a half months of age, amounting to 60 cents per bird.

Soy bean meal was compared with beef scrap on early-laying Barred Rock pullets. The proportion of soy bean fed in the mash was one-third greater than of the beef scrap. The results obtained greatly favour beef scrap. This lot produced eggs at a cost of 24 cents per dozen, while the cost of eggs from the soy bean lot was 47 cents.

Experiments comparing closely confined birds with those allowed to run indicate that confinement is an advantage with pullets of the White Leghorn variety, but not with old hens. In the fertility of eggs, the confined birds in both cases were 2 per cent higher.

BEES.

A very poor honey crop was obtained, the weather being very unfavourable during the principal honey flow. The manipulation to prevent swarming was not satisfactory in this district, as the bees killed their queens, which meant much wasted time in building up colonies. An increase of four colonies was obtained. The greatest production from a single hive was 35 pounds.

FIELD HUSBANDRY.

Rotations.—The four-year rotation consisting of: First year, hoed crop, corn or roots; second year, grain seeded down; third year, hay; and fourth year, pasture; has been continued with good results.

Crop Yields.—The following table shows the amount of each crop grown in 1917:—

Crop.	Yield.	
	Tons.	Lb.
Corn silage	313	127
Clover silage	173	1,200
Pea and oat silage	109	1,780
Clover hay	46	880
Mangels	85	1,100
Turnips	8	1,220
Carrots	6	1,600
Sugar beets	1	1,460
Potatoes	12	200
Mixed grains	23	
Oats	8	1,550
Peas	1	1,200
Barley		1,400

Cultural Experiments.—One hundred and forty plots are used for cultural investigational work, the chief objects in view being to determine: (1) The best method of preparing land for hoed crops, (2) the best seasons for applying barnyard manure; (3) methods of applying chemical fertilizers to mangels; (4) the best after-harvest cultivation of root land in preparation for a grain crop to be seeded with clover.

FERTILIZER EXPERIMENTS.

The fertilizer experiments A and B, started in 1915, were completed with the harvesting of the 1917 crop. A new experiment designated "E 7" is planned for the section formerly occupied by the old experiments. The primary object of the new experiment is to determine the most profitable combination and quantity of a fertilizer mixture as measured by its influence, in relation to cost, throughout a three-year crop rotation consisting of, first year, mangels; second year, grain; third year, hay.

CEREALS.

With the exception of the wheat varieties, the cereal work was conducted as usual. Of the eighteen varieties of oats tested, Gold Rain was first with a yield of 104 bushels 14 pounds per acre, while Banner was second with a yield of 100 bushels 20 pounds. Eighty-day, which matured in ninety-three days, gave the best yield of the early varieties. Of the twelve barleys tested, Gold repeated its performance of the previous year by heading the list with a yield of 58 bushels 21 pounds per acre. Odessa proved to be the best six-row barley. Solo and Arthur were the best yielding varieties of peas.

FORAGE CROPS.

Indian Corn.—The season of 1917 was suitable for the production of excellent corn crops. The long growing period gave an unusual advantage to the large, late kinds. Nine varieties were tested by the double plot system in one-hundreth-acre plots. Six of the most popular varieties were also tested in half-acre plots. In each Golden Glow proved the highest yielder.

Roots.—Twenty-six varieties of swede turnips, six of fall turnips, eighteen of mangels, eleven of carrots, and three of sugar beets were grown in duplicate test plots. All yields were below the average. Tankard Cream was again the best yielding mangel. Mammoth White Intermediate carrot and Russian grown beet seed proved superior to the other varieties. Ottawa-grown turnip seed of the Good Luck variety was superior

to the commercial and to Cap Rouge-grown seed. Commercial seed of the Giant Yellow Intermediate mangel produced larger yields than the Ottawa-grown seed, while the small seed gave greater returns than the large seed. Some work in root seed production was done.

Soiling Crops.—Six varieties of soiling crops were grown. Rape kale proved to be the heaviest producer yielding 26 tons 850 pounds of green forage per acre.

Grasses and Clovers.—A seeding of 10 pounds of Red clover and 2 pounds of alsike per acre gave a much greater yield than any of the other mixtures tested. The light seeding of alfalfa gave the poorest yield, while a seeding of 20 pounds per acre proved the best.

HORTICULTURE.

The two ice storms which struck the Fraser valley during the month of December did much damage to the trees and shrubs, and their effects will be felt for some years to come.

The young orchard suffered severely, particularly the cherries and plums. Most of the walnut trees are ruined, the Japanese varieties standing the test best of all. Elms, oaks, and willows of all kinds and many of the flowering shrubs are damaged.

Fruits.—The orchard and small fruits did well last summer and some of the trees bore a small crop of apples and plums. Strawberries, however, were not good.

Vegetables.—The vegetable tests, both varietal and cultural, were continued with good results and experiments in planting and cultivating potatoes were also carried out.

Flowers.—Roses were a great success this season as also were the perennials, sweet peas and annuals, though owing to a late spring, they did not flower as early as usual. Not much seed of annuals could be saved this year as the autumn was so wet.

FARM IMPROVEMENTS.

Buildings.—The chief improvement work done on the buildings during the year consisted of painting the sheep barn, bull stable, silo. and dairy. A portion of the dairy was also replastered with a waterproof plaster. A pit scale was installed in the feed room of the cow barn.

Sidewalk.—A 4-foot cement sidewalk was constructed from the dairy barn, past the bull pens, to the piggery. This improvement adds greatly to the ease of transferring feed to these buildings, and is much appreciated by visitors during wet weather.

Fencing.—The old fence forming the paddock at the rear of the dairy barn was removed and replaced by one of good woven wire and square cedar posts. A number of the old hog fences at the north of the Farm were also removed, which allowed the extension of one of the rotation fields.

Land Clearing.—Three acres of land on the east portion of the Farm next to the Canadian Pacific railway were cleared and stumped. Six and one-half acres just north of it were underbrushed and will be used for sheep pasture. The 5 acres cleared in 1916 produced a good crop of peas and oats and also afforded some excellent pasture for the stock in the late fall.

EXHIBITIONS.

A travelling educational exhibit from the Agassiz Experimental Farm was staged at the following fairs: Vancouver, North Vancouver, Central Park, Coquitlam, Langley and Surrey. A cheese exhibit was also shown at Vancouver Exhibition and Victoria Home Products Fair. A small display of poultry models was sent to the

Mission Poultry Show and a pleasing collection of flowers was shown at the Agassiz Flower Show. A large number of persons were interested in the work of the Farm through this agency.

MEETINGS.

Besides the fairs mentioned above, the writer attended the following meetings: Annual meeting of British Columbia Holstein-Friesian Association, Essondale; Dairymen's Convention, Kelowna; Poultry Show, Vancouver; Dairymen's Convention, Chilliwack; Live Stock Breeders Convention, Victoria.

VISITORS.

It is estimated that 1,880 persons visited the Farm during the year.

EXPERIMENTAL STATION FOR VANCOUVER ISLAND.

REPORT OF THE SUPERINTENDENT, LIONEL STEVENSON, M.S.

SEASONAL NOTES.

The climatic conditions of the year did not favour agricultural practice to the degree that is usually experienced in this district. A cool, late spring followed by an exceedingly dry summer period reduced to below average the yields of spring-sown crops on the upland soils. The autumn-sown crops were not as seriously affected by the drought. The winter was very favourable to crops on the drained lands and considerable growth was made each month. The results secured from the autumn seedings have been such as to indicate the advisability of the practice when possible in preference to the seeding in spring.

METEOROLOGICAL RECORDS.

Month.	Temperature F.			Precipitation.				Sunshine.	
	Highest	Mean.	Lowest.	Rain-fall.	Snow-fall.	Total.	Heaviest in 24 hours.		
1917.				Inches.	Inches.	Inches.	Inches.	Hours.	Min.
April	64·00	45·48	33·0	4·09	.....	4·09	0·78	90	
May	72·50	51·10	36·0	0·70	.....	0·70	0·35	278	12
June	77·00	56·34	41·0	1·06	.....	1·06	0·35	217	36
July	85·00	62·52	43·5	0·18	.....	1·18	0·11	369	42
August	80·00	73·72	49·0	0·44	.....	0·44	0·22	339	36
September	76·50	56·00	42·0	1·35	.....	1·35	0·44	145	06
October	73·00	49·50	35·0	0·61	.....	0·61	0·43	154	36
November	59·00	46·03	33·0	1·85	.....	1·85	0·55	57	42
December	57·00	39·79	26·5	8·89	3·25	9·21	0·94	31	24
January	53·00	40·26	21·0	3·58	1·75	3·75	0·97	60	18
February	51·00	37·22	24·0	4·43	3·50	4·78	1·34	82	42
March	57·00	40·62	23·0	3·81	8·70	4·68	0·67	118	54
Totals	.....	.....	.....	30·99	17·20	32·71	.....	1,945	48

LIVE STOCK.

Horses.—Five work geldings are kept. These horses weigh 1,400 to 1,700 pounds each, and are used exclusively for land tillage and improvement work. The following ration was fed from April 1 to October 31: 1 pound of crushed oats, 4 ounces of wheat bran, and 1 pound of mixed hay per 100 pounds of weight of the horse. From Novem-

ber 1 to March 31 the grain ration remained the same, but oat straw was substituted for hay. Three pounds of carrots per horse were fed in addition to the grain and oat straw during the winter period. All horses thrived well during the entire year.

Cattle.—The Jersey herd established in December, 1916, has given an increase of four bull calves and one heifer calf during the year. These young cattle have all grown well. All animals have been fed liberally, and kept under ideal conditions. The butter-fat yields of the females in milk have not been as satisfactory as desired. All animals were tuberculin tested in December and no reactions were found.

POULTRY.

The costs of production work instituted in this department at its inception has been continued during the year. Feeding experiments for egg production, maintenance, and flesh production were carried out. Electric and oil-burning incubators of different types were tested. Costs and methods of brooding by hens and oil-burning brooder stoves were compared. A very satisfactory substitute for beef scrap was found in fish meal, a product always easily available on the coast. All birds have been trap-nested, and records of production kept. The best individual pullet-year record was 268 eggs, while ten pullets averaged 247·5 eggs each. Pedigree breeding has been started, and a system of recording worked out.

APIARY.

The five colonies were wintered outdoors in case-covered hives. The loss from any colony has not been as great as it was when the colonies were wintered without any protection. The surplus honey extracted from the apiary averaged 10 pounds per colony, which little more than paid for the sugar purchased for early spring and autumn feeding.

FIELD HUSBANDRY.

Rotations.—Four rotations are being operated at this Station, namely:—

Two-Year. First year, autumn-sown oats, peas, vetch and rye; second year, spring-sown rye, vetch and Egyptian clover, both crops grazed as temporary pasture.

Three-Year. First year, oats; second year, clover; third year, beans.

Four-Year. First year, corn; second year, wheat; third and fourth years, clover.

Four-Year. First year, oats, peas, and vetch for silage; second year, grain; third and fourth years, clover.

Crop Yields.—The total area in grain including test plots was 23 acres. Autumn wheat yields varied with varieties and locations from a minimum of 40 bushels to a maximum of 55 bushels in plot tests. The field average for 7 acres was 42 bushels.

Spring wheat yields in test plots varied from 19 bushels per acre to 27¼ bushels per acre. Oat yields varied in test plots from 47 bushels to 68 bushels per acre, with a field average of 46 bushels per acre.

Peas.—The yields of this crop varied in test plots from 22½ bushels to 39 bushels per acre, with a field average of 38 bushels per acre.

Corn for ensilage was severely checked by summer drouth and gave a yield of 7 tons 800 pounds per acre.

CEREALS.

The following classes of grains were tested in the regular test-plot work:—

Winter wheats	nine varieties.
Spring wheats	eight varieties.
Winter barley	two varieties.
Spring barley	six varieties.
Winter peas	three varieties.
Spring peas	nine varieties.
Winter oats	two varieties.
Spring oats	ten varieties.
Winter rye	four varieties.
Spring vetch and tares	three varieties.

The cereal breeding started in 1916 was continued with good results. The cereal breeding plot now contains fifty hybrids and selections that have been made at this Station. The results from the cereal work at this Station indicate that more attention should be given to autumn-sown cereals in preference to spring crops.

FORAGE PLANTS.

Indian Corn.—Thirty varieties of corn were tested for fodder production giving a range of yields varying from 3 tons 1,960 pounds to 12 tons 1,855 pounds.

Twelve varieties of corn were tested for grain production and gave a range of yields varying from 75 pounds to 1,390 pounds per acre. King Philip proved to be the best prospect.

Roots.—Four varieties of mangels were tested and gave yields up to 16 tons 990 pounds per acre. Eight varieties of carrots were tested and gave yields up to 21 tons 500 pounds per acre. A large range of forage crops and forage crop combinations were tested, totalling in all 35 plots. Three varieties of sugar beets were also tested. A beginning has been made in root seed production. An area of alfalfa was established to test different distances of seeding when the row system is employed.

The plant breeding in this department has been confined to corn. Two of the hybrids secured in 1915 are promising; they are selections from the progeny of the North West Dent and Stowells Evergreen cross in one instance and the Adams and Wisconsin No. 7 cross in the other.

HORTICULTURE.

The orchards have grown very satisfactorily during the year, and small quantities of fruits and nuts were obtained. The system of clean cultivation has been practised to date in order that the newly cleared land could be brought into condition. The growing of legume crops for mulching will be practised in the spaces between trees in future.

The arboretum on the south and west sides of the horticultural area was successfully seeded to clover during the early part of the year. The trees in the experimental nut orchard have made fair growth, more especially the walnuts and almonds.

The production of the various small fruits was very satisfactory, and one record yield was obtained. The vegetable variety test work was somewhat reduced from the scheme of previous year and more time was devoted to experimentation in vegetable seed production. Fertilizer tests in vegetable production were carried out on a limited scale.

Ornamental Gardening.—The work with flowering bulbs has increased during the year, and there are now 25,000 bulbs set in the test plots in addition to those in the landscape. The work with annuals and perennials was somewhat reduced in order that concentration could be made on the more important lines. Considerable planting of trees and shrubs was done in the landscape area. Soil-improvement work was carried on during the dry period by way of treating the clay area used for vegetable and bulb work with a 3-inch application of sand. This treatment has improved the tilling quality of the soil in question.

BUILDINGS.

An implement shed, 48 feet by 24 feet, and a pump house, 16 feet by 16 feet, were erected during the winter period. These buildings are of plank frame, plain in type, serviceable, and of low cost, such as could be duplicated on any farm.

FARM IMPROVEMENTS.

The removal of stones, tile drainage, road improvements, and fence improvement work have received considerable attention throughout the year.

EXHIBITIONS.

The following exhibitions were attended and the Station educational exhibit set up: South Saanich Flower Show, the Nanaimo Agricultural Society Fair, the Comox Agricultural Society Fair, the Cowichan Agricultural Society Fair, the North and South Saanich Agricultural Society Fair, the Islands Seed Fair, the Lower Mainland Seed Fair at New Westminster, the Upper Country Seed Fair at Armstrong, and the Home Products Exhibition in Victoria.

A permanent exhibit has been maintained in Victoria.

MEETINGS ATTENDED.

The Superintendent attended and acted as judge of exhibits at the following fairs and exhibitions: the South, West, and North Saanich Flower Shows, the Nanaimo Agricultural Society Fair, the Comox Agricultural Society Fair, the Ladysmith Agricultural Fair, the Islands Seed Fair at Duncan, the Seed Fair at New Westminster, and the Seed Fair at Armstrong.

The Superintendent attended, by request, and delivered addresses at the following organizations' meetings: Seed Growers meeting held at Duncan, South Saanich Farmers Institute, the Sidney Board of Trade greater production meetings, the city of Victoria greater production meetings, the Ward 4 greater production meetings, the British Columbia Dairymen's Summer convention at Kelowna, the British Dairymen's Winter convention at Chilliwack, the Islands Seed Fair at Duncan, the Seed Fair at New Westminster, the Seed Fair at Armstrong, the organization of the British Columbia Seed Growers Association, the Short Course in Agronomy at the University of British Columbia. The executive meetings of the Food Products committee of Victoria Board of Trade, the British Columbia Dairymen's Association, the British Columbia Seed Growers Association have received due attention.

Greater Production.—All organizations in the district working for greater production of Foods have been assisted in an advisory way in council, in a publicity way on the platform and in a practical way by the distribution of good seed, to the limit of our ability to do so.

VISITORS.

Over three thousand people visited the Station during the year; a number of these were picnic parties of business people from Victoria, Farmers' and Women's Institute picnics, Red Cross organizations, tourists, and numerous individual visitors from the district.